



Toronto Fire Services Quality Assurance Review

Dave Mitchell & Associates Ltd

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1. Executive Summary

Toronto Fire Services (TFS) provides dispatch for its recently amalgamated department from a purpose-built building at 4330 Dufferin. This is also the location of the dispatch facility for Toronto Emergency Medical Services (TEMS), as well as the backup facility for the Toronto Police Service and 9-1-1; it is also the administrative headquarters for TFS.

The Toronto Fire Service is the largest fire department in Canada and is one of the 5 largest in North America. Dispatchers and support staff are employees of the fire department and certified by the International Association of Fire Fighters, Local 3888. The department including its dispatchers manages more than 140,000 emergency calls per year and responds to a wide range of issues from a catastrophic power failure, to SARS and the full range of fire and other emergencies typical of a city of this size.

Amalgamation of several local departments into Toronto Fire Services occurred in a relatively short period of time and a great deal of effort was required to unify the dispatch system to meet the needs of the citizens of Toronto and its fire fighters. It required staff from different departments to be merged into a new organizational structure with a change to the command and operational model. The change also required a replacement facility as well as the procurement of a new Computer Aided Dispatch (CAD) system and implementation of a new regional radio system.

Management and staff of the TFS dispatch facility have always understood that their mission was to perform emergency call taking and dispatch with the highest degree of speed and accuracy possible. The need for speed and accuracy in a fire dispatch facility is obvious when the life-critical nature of fire and rescue incidents is properly understood. That said, although it is inherently obvious that speed and accuracy are important, it is not until fairly recently that defined standards of service have been developed.

The organization that defines the standards of service for 9-1-1 and fire dispatch is the National Fire Protection Association (NFPA). The NFPA's standard 1221 has been in existence since the

late 1800's and is in its 31st edition¹. Although the standard has been in existence for a considerable number of years, it is only recently that it has included the concept of job performance specifications. These specifications are discussed in greater detail later in the report but simply put they require the transfer of a 9-1-1 call to be completed in 30 seconds or less 95% of the time and for the fire dispatch process to be completed in 60 seconds or less, 90% of the time. In addition the 1221 standard outlines the requirement for a quality assurance program *"to ensure the consistency and effectiveness of alarm processing"*.²

The need for a quality assurance review was identified by TFS a number of years ago, as part of its ongoing program of modernization and coincident with the identification of this requirement in the NFPA 1221 standard. The contract for the quality assurance review was awarded in 2008 and was structured to have an external consulting firm work closely with TFS staff to ensure that it continued to be a learning organization. That is, the goal was to avoid a study whereby the consultants reviewed the organization and returned with a set of recommendations. Instead it was felt that greater value would accrue if the management and operational personnel worked with the consultant to gain the knowledge to define and implement the quality assurance program.

Over a period of nearly 12 months, the consultants worked in close cooperation with TFS staff to review Toronto's call management metrics for fire in light of the NFPA standard. This required a full review of the CAD system data in addition to reviewing 9-1-1 call management data. The consultants also spent extensive time sitting with the staff while they performed their duties, clarifying the ways in which work was completed. Training material was reviewed and feedback sought from the trainers and personnel with regard to how effective this was.

The consultants also met with senior fire management personnel on a regular basis and included them in the review process. The disaster recovery strategy for TFS was reviewed and this included a detailed review of the primary and secondary alternate sites; it also included a real-time recovery from the backup centre to the principal centre at 4330 Dufferin.

Through all phases of the study, staff from TFS cooperated fully with the review team. To a person they have remained very interested and by their daily activities have demonstrated their

¹ NFPA 1221, 2010 edition.

² NFPA 1221, 2010 edition, Section 7.7.

commitment to the citizens and fire fighters of Toronto. Staff has also been open to discussing new ideas, and participated very fully with a strategic planning session that was held early in 2009. The objectives of the strategic plan included the need to confirm the mission and level of quality that was being sought as well as the ways in which this could occur.

Review of 9-1-1 data was a challenge at first in that until this study commenced no performance data was being produced by the telephone company or reviewed by Police and Fire. Chief Bill Stewart in cooperation with Chief Bill Blair agreed on the need for the review of this data and worked with Bell to produce monthly reports effective September 2008. Review of this data shows that the first requirement, which is to receive the initial 9-1-1 call and pass it to TFS appears not to be within the expected timeframe. Toronto Fire and Police are encouraged to continue receiving and reviewing this data and hopefully to extend this to a Province-wide initiative for a 9-1-1 users group similar to those existing in other provinces.

Review of the fire call taking and dispatch process required the development of a data view by members of the TFS information technology section. This was completed and one year's worth of data (2008) has now been assessed. Based on this data it appears that TFS is not currently achieving the requirement to dispatch 90% of calls within 60 seconds, for the period of time that was reviewed. The call data suggests that the average call completion time for all incidents is in the range of 75 seconds and the 90th percentile (which is the standard) is approximately 95 seconds.

There are a number of reasons why this is occurring and they relate to technology, training, supervision and staffing. In the first case, the current version of CAD is slated for a major upgrade and one requirement of this upgrade will be to reconfigure the system based on best practices noted from other regions. Developments in software linked with the need to quickly and accurately process calls has led to a new set of user requirements for the CAD system. The new user requirements were developed jointly by the dispatch and IT personnel along with the consultants. It is expected that once these are implemented, that a significant improvement in call taking and dispatching times can be achieved.

Training of dispatch staff has been extensively reviewed and in principle many of the training initiatives are productive and assist with the objectives of making call taking as fast and accurate as possible. One area that will be improved is on-duty training of call taking and

dispatch staff. It is proposed that there should be a new focus on training for consistent operation of the CAD and other peripherals and that this be supported by an additional level of training. Supervision will also be enhanced by an increased focus on CAD and telephony data to support real-time awareness of performance including business intelligence software that will support this. These solutions will allow for a very immediate resolution of problem areas that might occur and will provide positive feedback to operational and supervisory staff.

The CAD data also identified an inequity in the case load between the four 'commands' the department is divided into for suppression and dispatch purposes. The south command is currently managing 33% more incidents on a daily basis than the other three. This suggests that an additional dispatcher/radio operator should be considered for this position, certainly during the busiest periods of the day.

It was noted that a major upgrade of the CAD system was pending but that it was planned as a simple version upgrade without changing functionality in any major way. This was reviewed with TFS staff in light of changes to CAD recommended in this report to improve transactions times and to make the call taking and dispatch processes more efficient. A draft CAD user requirements document was developed by the staff with the assistance of the consultants and this is now the basis of an approved CAD upgrade that will include the changes recommended including Business Intelligence software.

At some point a review of the current fire hall alerting system is also required to ensure that it operates with greater speed than is currently the case. This is an opportune time for reconsideration given that the radio system which handles alerting traffic currently, is being replaced. The second reason to reconsider the matter of fire hall alerting is the recent availability of I.P. based alerting systems which operate in parallel and as a result are very much quicker than legacy systems that use sequential alerting modes with slower system acknowledgements.

In summary, the staff and management of Toronto Fire Services have embraced the need for a complete focus on quality assurance and are to be congratulated for this. Dispatch managers and other personnel are very conscious of the need to meet and if possible to exceed the relevant standards of service as that will ensure the quickest possible arrival of Toronto fire crews for emergencies.

The concept of quality assurance is one that has also been embraced by the department. Staff will now work with the various recommendations to make the required changes in their technology, their training, their operational model and their staffing to achieve these. A quality assurance program will require the review and reporting of performance metrics in real time and this will in turn require the establishment of what might be termed a professional standards section to ensure that recruitment, training, mentoring and supervision are each optimized to ensure the service objectives are being met and that they are reported.

2. Project Scope

The need to develop a Quality Assurance program was identified in the 2007 TFS Master Fire Plan.

Quality Assurance has been identified as an issue within the Communications section, with a request in the operating budget for a staff person for this purpose in both 2006 and 2007 with no approval. As part of the 2006 Capital Budget, funding was approved to undertake a Quality Assurance Study. This study will assess the current technology in use in the Communications Centre to validate the systems and determine if these systems are being leveraged to effectively support TFS processes. The effectiveness of internal policies, procedures and staff training will also be included in this review. The audit will determine the degree to which Communications section staff are meeting the requirements of the citizens of Toronto and other Fire Service divisions, primarily Operations division staff. This study is expected to be completed in 2007, and will form the basis for a new business case for an additional staff person in the 2008 Operating Budget cycle.³

Based on this, Toronto Fire Services subsequently awarded a contract with the following scope of work for the consultant⁴.

1. *Developing a project work plan with TFS Project team with respect to the Project;*
2. *Participate in meetings, including conference calls, as requested by the TFS Project Manager;*
3. *Advising TFS Project team on data collection and analysis;*
4. *Review of data collection and advice to TFS Project team on analysis of data, including, without limitation, analyzing the degree to which TFS meets, or fails to meet, the standards of service outlined by the NFPA 1221;*
5. *Review of survey comparing TFS's Communications Division with other large fire services communications centres in Canada and the United States conducted by TFS Project team;*
6. *Review of TFS' assessment of TFS staff training and preparedness based on applicable standards such as NFPA 1221 and current best practices for fire*

³ Toronto Fire Services, Master Fire Plan 2007, page 62.

⁴ Dave Mitchell & Associates Ltd.; resumes for those individuals involved are included in the appendices.

dispatch facilities of similar size, and recommendations with respect to any proposed changes in practices and priorities;

- 7. Review of data analysis and advice to TFS Project team on development of recommendations;*
- 8. Advice on formulation and structure of draft report, including issues to be addressed in the report;*
- 9. Review of recommendations with respect to the TFS Project team draft report*
- 10. Final review of TFS Project report and quality assurance program for the ongoing review of emergency call management, including recommendations.*

The project scope was agreed and work commenced in July 2008 with the first of several site visits. In addition regular weekly on-line project management meetings were conducted to deal with the various tasks.

3. Background

The existing dispatch centre for Toronto Fire Services was built in response to the amalgamation that consolidated a number of fire departments following the passage of Bill 103 by the Ontario Legislature in 1997. The following is a brief chronology of the amalgamation and subsequent history of TFS dispatch.

1. 1997
 - a. Bill 103 was passed
 - b. Committees organized to map out the amalgamation of the communication centers
 - c. Automatic Aid for medical calls established
 - d. Staff trained / CAD and manual systems updated with related information
2. 1998
 - a. January:
 - i. 6 existing centers: (Etobicoke, East York, North York, Scarborough, Toronto, North York)
 - ii. Automatic Aid procedure implemented for cross border dispatching
 - b. February:
 - i. CAD RFP finalized
 - c. July:
 - i. Division Chiefs appointed⁵
 - d. July:
 - i. Transition budgets submitted
 - e. October:
 - i. Harmonized response guidelines introduced
 - f. December:
 - i. Radio Communications system contract approved and signed by Council
 - ii. Facilities planning – new Communications Center
3. 1999
 - a. January:
 - i. CAD presentation
 - b. March:
 - i. York Communications Center upgraded to 800 Mhz conventional system
 - ii. Assistant Radio Manager hired⁶
 - c. March-December:
 - i. Y2K planning/implementation
 - d. June :

⁵ Vera Maute appointed as Communications Division Chief.

⁶ Frank Pappone.

- i. Project manager⁷ for radio communications system hired
- 4. 2000
 - a. April:
 - i. Establishment of 4 new Communications District Chiefs positions
 - ii. Organizational chart identified with 14 call taker/dispatchers per Platoon, with a minimum on duty staffing of 10
 - b. August:
 - i. New Communications District Chiefs⁸ promoted
 - ii. Hickson chemical plant fire⁹
 - c. October:
 - i. Deputy Chief Terry Boyko appointed as interim Deputy of Communications;
 - ii. Mike Dubé hired as CAD Manager
 - d. November¹⁰:
 - i. Phase 1 Cutover
 - ii. Cutover to central Communications Center at 703 Don Mills Rd, (Toronto/York/East York only)
 - iii. Old Toronto Communications center established as temporary backup site
 - iv. Command restructuring implemented with 3 digit numbering system
 - e. December:
 - i. Chief Simpson new Deputy of Communications
- 5. 2001
 - a. March/April:
 - i. Training for Communications Division staff; Training conducted at 4330 Dufferin St
 - b. June¹¹: Phase 2 Cutover
 - i. New communications center at 4330 Dufferin St operational with staff from former Toronto/York/North York covering the geographic area of Toronto/East York/York and North York
 - ii. 703 Don Mills designated as permanent communications backup site
 - iii. Minimum staffing levels established for Phase 2
 - iv. Call-Taker/Dispatcher model implemented
 - v. Police communications backup relocated to 4330 Dufferin St
 - vi. Command restructuring completed

⁷ Mark Thompson.

⁸ Jim Parton, Jim Bailey, Ray Pade, Daryl Wright.

⁹ August 9th.

¹⁰ November 29th.

¹¹ June 11th.

- c. July:
 - i. Recruitment and training of first 4 new staff at Dufferin
 - d. September:
 - i. Sharon Powell—Communicator of the Year for 6th alarm townhouse fire at Dufferin/Lawrence (before amalgamated Comm Center)
 - e. November:
 - i. Phase 3 Cutover
 - ii. Cutover of West Command (Etobicoke) to 4330 Dufferin St¹²
 - iii. Cutover of East Command (Scarborough) to 4330 Dufferin St¹³
6. 2002
- a. April:
 - i. I/Netviewer implemented
 - b. July:
 - i. Mike Dubé promoted to Division Chief, Information and Computer Systems
 - c. July 22-28:
 - i. World Youth Day
 - d. September:
 - i. Margaret Cannon—2002 Communicator of the Year for fire Feb 13, 2002 @ 9 Elgar Ave with a boy trapped in a basement
7. 2003
- a. January:
 - i. Written exams implemented for Communications DC's and Captains
 - b. February:
 - i. Subway Radio System (SRCS) put into service
 - c. March:
 - i. SARS
 - d. May:
 - i. Fire Chief Stewart promoted
 - e. August:
 - i. Blackout across southern Ontario and Northeast US states¹⁴
 - f. September:
 - i. 9-1-1 Services Day – Platoon 3 recognized for managing the call volume on the night shift during the Blackout. Award accepted by D/C Wright. During this shift they managed 1,195 events during their 14 hour night shift.

¹² November 18th.

¹³ November 30th.

¹⁴ August 16th.

- g. October:
 - i. Cutover for InterCAD with Toronto Emergency Medical Services (TEMS).
Reduces call volume on TEMS queue from 6,000 monthly to 2,000
- h. November:
 - i. TEMS to Fire Cad interface implemented
 - ii. Readerboard installed in Communications Center
- 8. 2004
 - a. May:
 - i. Posting for Communications Training Captain
 - b. September:
 - i. Dale Henry (Platoon 1)—Communicator of the Year for Muggs Island fire on the Toronto Islands
 - c. November:
 - i. CAD upgrade to 7.9.2
 - ii. New minimum staffing levels implemented (12 on weekends and Night shifts)
- 9. 2005
 - a. January:
 - i. New Communications shift schedule implemented
 - b. February:
 - i. Change in 9-1-1 protocols – Police no longer passing on medical calls to Fire. 9-1-1 Queue call volume drops from 6,000 monthly to 4,000.
 - ii. Police only responding to Delta and Echo Tiered Response events
 - c. August:
 - i. Fire RMS implemented
 - ii. Severe weather event on August 1, 2005 caused flooding at HQ, threatening the second floor equipment room
 - d. September:
 - i. Adrian Whiteman (Platoon 4) named 2005 Communicator of the Year for 2nd alarm with persons trapped
 - e. November:
 - i. E-9-1-1 Wireless project initiated
 - ii. TEMS implements changes to their call handling procedures which affects interface
 - f. December:
 - i. Cutover to SMS – new payroll reporting system
 - ii. Symposium phone system go live
 - iii. Phase 2 InterCAD – highway calls
 - iv. Promotional examination for Communications District Chief

10. 2006

- a. January:
 - i. Complete power failure at Dufferin¹⁵; first response group responded to Don Mills Road while calltaking and manual dispatch continued at Dufferin. With battery backup at Dufferin, workload was split between two sites until the incoming shift relocated operations to Don Mills Road
 - ii. New recruit class (4 new staff members)
- b. March:
 - i. Rescue/merit award presented to Platoon 3 for their actions during a severe weather event that resulted not only in increased call volume, but flooding at HQ
- c. September :
 - i. Communicator of the Year Award presented to Platoon 4 for managing operations during the power failure in January. Award accepted by Captain Konoplicky
 - ii. TFS Communications Division staff on the planning committee for the Annual APCO/NENA Canadian Conference, October 1-4, 2006
 - iii. Promotional Examination held for Communications Captain
 - iv. Project initiated to upgrade the Emergency Power System at Dufferin

11. 2007

- a. Master Fire Plan developed as a strategic planning framework
- b. Communications Training/Situation Room redesigned
- c. Response guidelines for Toronto Islands, Toronto Harbour and Lake Ontario implemented
- d. Pandemic planning
- e. Promotional Examination held for Communications District Chief
- f. April:
 - i. Deputy Pat McCabe retires April 30, 2007
- g. June:
 - i. Deputy Daryl Fuglerud promoted June 1, 2007
 - ii. Communications kitchen renovation
- h. June/July:
 - i. Two District Chief promotions (S. Bond, P. Konoplicky) and two Captain promotions (B. Bindon, S. Hastings)
- i. September:
 - i. Communicator of the Year – Lisa Cyr for providing lifesaving instructions to a caller at 927 St. Clair Avenue West until the citizen could be rescued by firefighters

¹⁵ January 6th

12. 2008

- a. February:
 - i. Ontario Fire Marshall Communicator Standards review committee
 - ii. Major fire at 615 Queen Street West
- b. March:
 - i. Captain promotion – K. Happell
- c. April:
 - i. Quality Assurance Review contract signed
- d. July:
 - i. Official project kickoff for the QA review
 - ii. Major fire at 20 Secord Avenue
- e. August:
 - i. Major fire at Sunrise Propane, 54 Murray Road
- f. September:
 - i. Communicator of the Year awarded posthumously to Kemolene Chadwick
- g. October:
 - i. Transfer of operations to Don Mills Road to facilitate the emergency power upgrade at Dufferin
- h. DECCAN project begins

13. 2009

- a. Rescue merit awards presented to Platoon 4 – Secord Avenue, Murray Road
- b. Communications Calltaker/Dispatcher Recruitment – 6 vacancies
- c. TEMS interface – Highway addressing revised
- d. June:
 - i. Emergency telephone system upgrade
- e. September
 - i. Communicator of the Year awarded to Karrie Johnson, dispatcher for the Sunrise Propane event

4. Methodology

The QA review was conducted along a number of tracks including a detailed review of data from the Computer Aided Dispatch (CAD) system¹⁶, and from the 9-1-1¹⁷ call management system in addition to observation of staff at each of the site visits. Also included was a detailed review of standing orders, the training material and operational guidelines¹⁸ (SOG's).

The current standards¹⁹ that apply to emergency communications in the North American fire service were also reviewed and used as a comparison between what was observed and measured within the TFS. An attempt to understand current best practices was undertaken using a survey of peer departments in Canada and the United States. Finally, a literature survey of all relevant material was conducted to clarify industry trends.

4.1. Metrics

The metrics that allow for an analysis of the call taking and dispatch processes include each step from the time an emergency occurs, until the emergency responders—in this case Toronto Fire Services—arrive at the scene and commence operations. These steps are dealt with in more detail in other sections, but at a macro level the goal is to measure and understand the following measurement points.

1. The time at which a call for emergency services is first placed—usually to 9-1-1;
2. The time it takes for the 9-1-1 call answering point to ascertain which emergency service is required and then to successfully complete the transfer;
3. The time it takes for the required emergency service to answer the phone;

¹⁶ Toronto Fire Services are using a CAD provided by Intergraph; the CAD system went live post the amalgamation, in November 2001.

¹⁷ Toronto's 911 system is managed by the Toronto Police Services; the supporting technology is provided by Bell.

¹⁸ Operational guidelines are referred by various names in emergency services; for the purposes of this report they will be described as Standard Operational Guidelines (SOG's).

¹⁹ The relevant standard is NFPA 1221: Standard for the Installation, Maintenance and Use of Emergency Services Communications Systems, 2010 edition.

4. The time it takes the emergency service to correctly question the caller and 'create' an incident for dispatch;
5. The time it takes the emergency service to dispatch the incident to the emergency responders;
6. The time it takes for the emergency responders to commence their response; and
7. The time it takes for the emergency responders to travel and arrive at the scene of the emergency and commence action.

In Figure 1, the first arrow (white background) includes the latency time during which someone realizes an incident has occurred and the time it takes to get dial tone and start the 9-1-1 call sequence including the time required for Bell to transfer the call to Toronto Police.

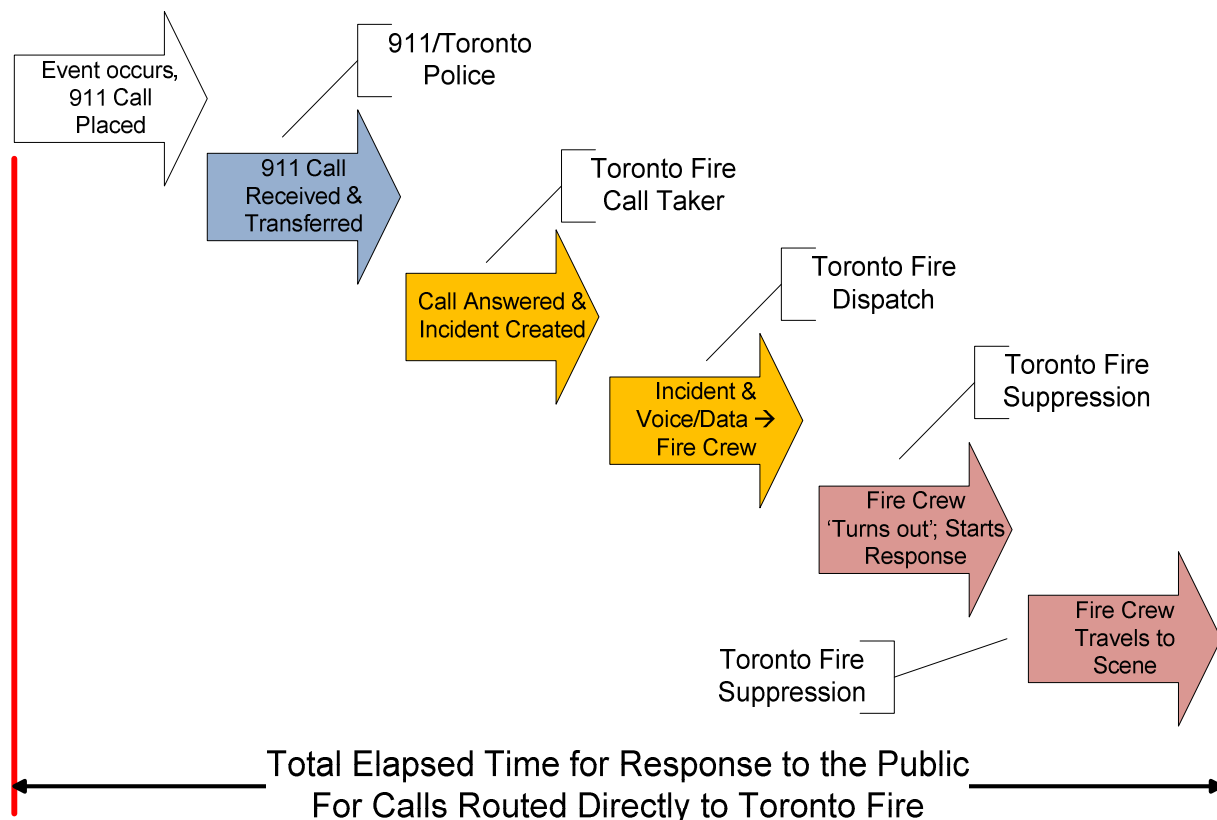


Figure 1: Fire Call Management Work Flow

The second arrow (blue background) includes the time it takes for Toronto Police to first answer the call and then determine it is for Toronto Fire as well as the time taken to transfer the call to

them²⁰. The third and fourth arrows (amber background) represent the times taken for Toronto Fire to answer the call being passed from Toronto Police, to obtain call details from the citizen and then to create a dispatchable incident in the CAD system and then to dispatch the fire crew²¹. The fifth and sixth arrows represent the turnout time and travel time by fire crews to the point they arrive on scene.

Figure 2 illustrates the ways in which the call model changes in the case of medical or 'first medical responder' incidents that TFS responds to. In these instances, the call is transferred to the TFS by way of an intervening step shown by the green arrow.

In this case, the emergency call for a medical condition or motor vehicle accident is first handled by Toronto Police but is then transferred to Toronto Emergency Services (TEMS). They obtain details from the caller using a dispatch protocol to obtain a diagnosis and a response code. Based on the response code, this information is transferred electronically to Toronto Fire by means of an interface called InterCAD. In the diagram this appears at the first amber arrow where the location for the incident and the medical details that are transferred, are reviewed by TFS personnel, units are assigned and the call is then dispatched like others.

²⁰ The objective for this is 30 seconds or less, 95% of the time.

²¹ The objective for this is 60 seconds or less, 90% of the time.

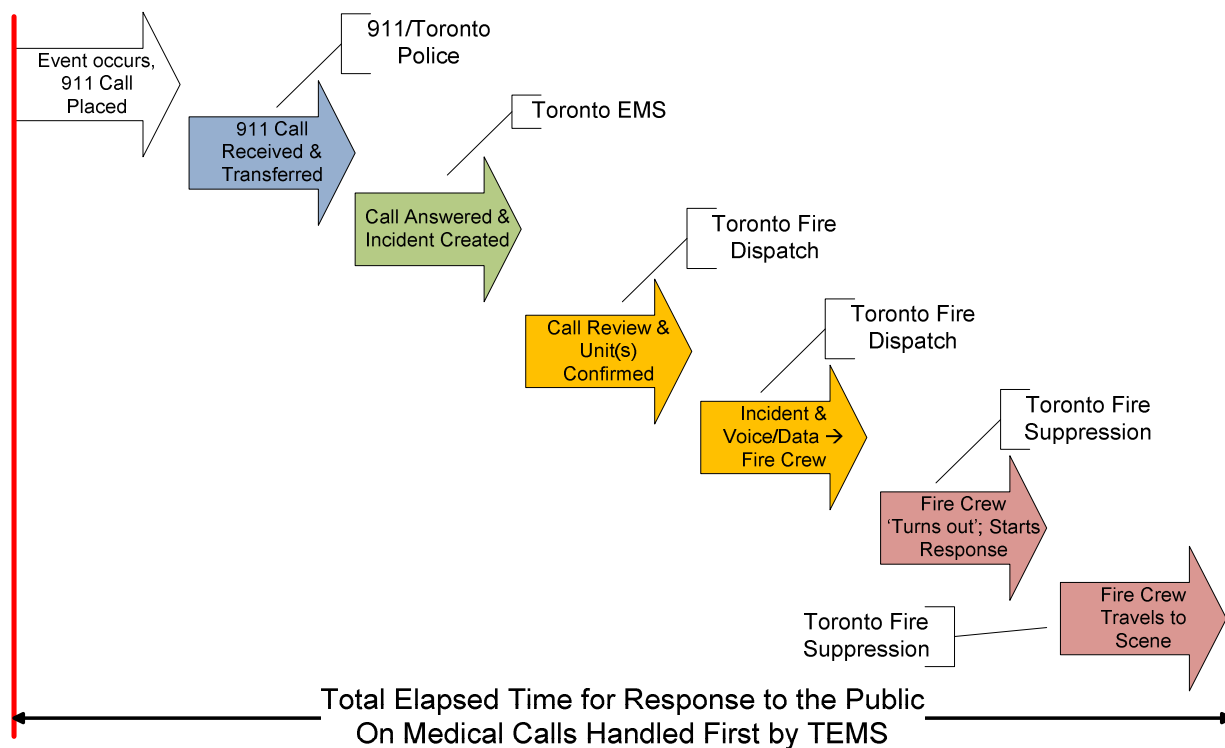


Figure 2: EMS Call Management from 9-1-1/Toronto Police to TEMS to TFS

The difference in this case is that there is an additional time 'metric' that must be understood given that TFS responds to more medical aid calls than any other type.

4.2. CAD System Data Analysis

Review of the CAD system information was a very time consuming matter as the CAD data had not been reviewed prior to this study, so a format to extract and view it did not exist.

Development of a data extract occurred with the assistance of Chief Maute and her staff²² including the District Chiefs in charge of the dispatch centre and the CAD system technical teams.

The data was extracted from the CAD system in a format that allowed for analysis. It should be noted that prior to this, the data from the CAD had not been reviewed on a regular basis to examine trends and to understand the degree to which performance criteria were being met.

²² At this point, and throughout the entire process, the cooperation of staff at all levels was exemplary.

This is similar to many other jurisdictions although there is a greater awareness of the value of the data that is regularly collected by CAD.

The TFS CAD system captures a tremendous amount of data including the time the incident was first received, the time it was 'accepted' as a dispatchable event, the address of the call, the type of call, the source of the call, the call taker's ID, the dispatcher's ID, the time it was dispatched to the fire halls, their acknowledgement of the alarm in addition to all status transactions from the mobile workstations in the vehicles, as well all additional comments added by the dispatchers.

For the purposes of understanding how the dispatch system operates in terms of call management standards, the CAD captures a number of key time stamps as shown below. As noted the applicable standard is NFPA 1221 and it prescribes two time measures—the first being the time to receive a 9-1-1 call and to successfully transfer it to TFS²³, the second being the time taken by the fire department to gather the correct information and dispatch the fire fighters by alerting them and passing this information to them²⁴.

²³ 30 seconds or less, 95% of the time.

²⁴ 60 seconds or less, 90% of the time.

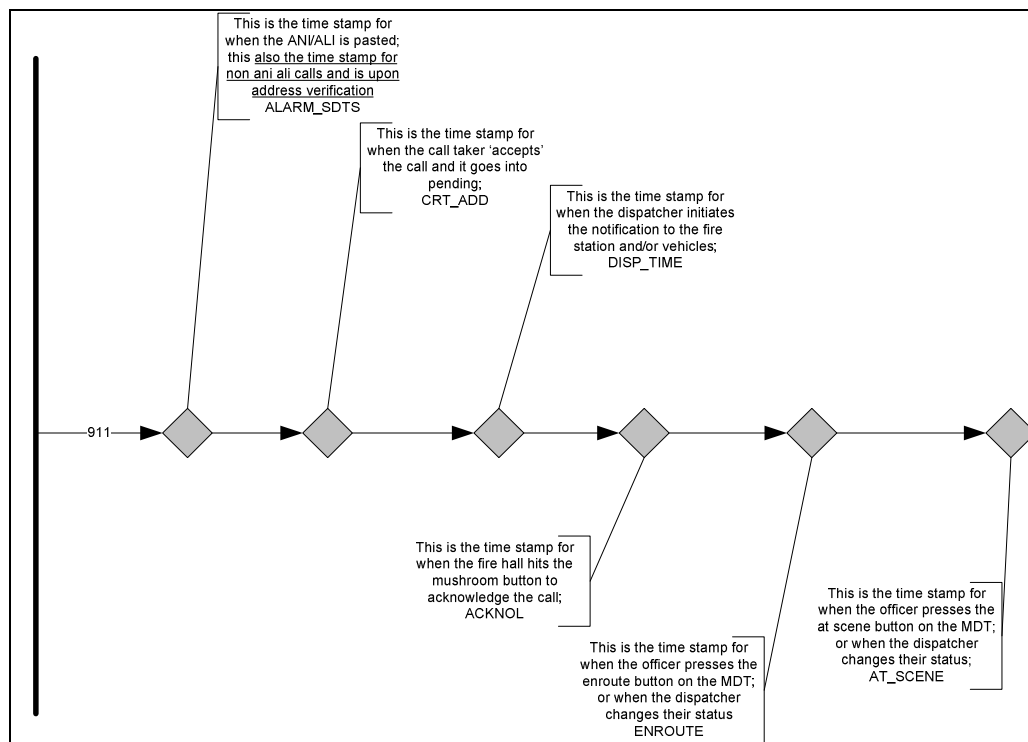


Figure 3: TFS CAD Time Stamps

The raw data is presented for analysis in a table format as shown on the following page. It is from this data set that the essential performance markers can be understood.

EID	EVENT NO	UNID	EVENT DATE	MONTH	HOUR	DOW	BEAT	CALL SOURCE	CALL TAKER	DISPATCHER	ANI TIME	ALRM SDT	CRT AD TS	DISP DS TS	ACKNOL	ENROUT E	AT SCENE	CLEAR
952415	F08000001		20080101	1	0	3	322	03-EMS	xxxx	xxxx	..	0:03:49	0:03:49	0:04:23	0:09:29
952416	F08000002	HR332	20080101	1	0	3	332	03-EMS	xxxx	xxxx	..	0:03:55	0:03:55	0:04:40	0:05:31	0:05:33	0:08:16	0:15:16
952417	F08000003	HZ332	20080101	1	0	3	332	03-EMS	xxxx	xxxx	..	0:05:35	0:05:35	0:06:39	0:07:12	0:08:13	0:14:42	0:33:42
952418	F08000004		20080101	1	0	3	332	03-EMS	xxxx	xxxx	..	0:05:37	0:05:37	0:05:55
952419	F08000005	P314	20080101	1	0	3	314	05-ALARM	xxxx	xxxx	..	0:05:07	0:05:46	0:07:29	0:08:09	..	0:10:42	0:16:55
952420	F08000006	P312	20080101	1	0	3	314	01-911	xxxx	xxxx	0:04:51	0:04:51	0:06:33	0:07:53	0:08:30	..	0:09:54	0:17:19
952421	F08000007	P331	20080101	1	0	3	331	05-ALARM	xxxx	xxxx	..	0:09:11	0:10:49	0:11:19	0:12:08	0:13:49	0:15:36	0:19:54
952422	F08000008	P143	20080101	1	0	3	112	05-ALARM	xxxx	xxxx	..	0:12:41	0:13:06	0:13:20	0:13:48	0:14:19	0:20:35	0:23:51
ALARM TO DISP		ADD TO DISP	DISP TO ACK	ACK ENR	ACK TO ENR	DISP TO ARV	ENR TO ARV	ARV CLR	ST NO	ST NAME	ST TYPE	DIR	MUN	LOCATION				
0:00:34	0:00:34	N/A		N/A		N/A	N/A	N/A	100	FRONT	ST	W	TT	100 FRONT ST W TT: @ROYAL YORK HOTEL				
0:00:45	0:00:45	0:00:51		0:00:02		0:03:36	0:02:43	0:07:00					TT	LL(-79-22:56 6831.43-39:06 3144)BAY ST / QUEEN ST W TT				
0:01:04	0:01:04	0:00:33		0:01:01		0:08:03	0:06:29	0:19:00	100	FRONT	ST	W	TT					
N/A	N/A	N/A		N/A		N/A	N/A	N/A					TT					
0:02:22	0:01:43	0:00:40	N/A			0:03:13	N/A	0:06:13	30	CARLTON	ST		TT	30 CARLTON ST TT: @DAYS INN				
0:03:02	0:01:20	0:00:37	N/A			0:02:01	N/A	0:07:25	565	YONGE	ST		TT	565 YONGE ST TT:				
0:02:08	0:00:30	0:00:49		0:01:41		0:04:17	0:01:47	0:04:18	954	KING	ST	W	TT	954 KING ST W TT				
0:00:39	0:00:14	0:00:28		0:00:31		0:07:15	0:06:16	0:03:16	3	GOLDFINCH	CRT		NY	3 GOLDFINCH CRT NY				
0:00:50	0:00:50	0:00:31	N/A			0:06:48	N/A	0:06:36	125	NEPTUNE	DR		NY	125 NEPTUNE DR NY				

4.3. Site Reviews

Site reviews were considered to be of primary importance to the study from the very beginning. The reasons for this included the need to engage the staff at all levels regarding the issue of quality assurance and to ensure the greatest possible level of buy-in for the recommendations. It was recognized that the Dispatchers, the District Chiefs and the Division Chief are arguably the most experienced with fire dispatch in Canada based on their call volume and the range of calls to which they regularly respond and that a great many of the solutions would be identified by them.

The site visits included meeting with the dispatch staff from the July 2008 kickoff session onward. During these visits the consultants were given completely free rein to sit with any staff member, on all shifts and to discuss any and all issues. Simply put, this was very rewarding and the professionalism and personable nature of the staff cannot be over-stated. Their honesty was refreshing and was always delivered in a positive manner. The visits with the dispatchers also included periods while they operated at their backup site, during shift change, during the day and night shifts and during the shared evening meal that is so important to maintaining the positive spirit that is in evidence.

4.3.1. Dispatch Management

The quality assurance review included discussion of the issues with Division Chief Vera Maute and her staff including the District Chiefs, the shift Captains and the training Captain. During the review it was noted that the work load for each of these is significant and continually evolving.

There are a number of initiatives currently underway that should alleviate some of this including the oft-stated goal of achieving a paperless operation. That will not happen completely, but the initiative to put more and more of the documentation including operational guidelines into an HTML format should be continued. This would make all of the documentation available in soft copy at all workstations including the dispatch workstations, eliminating the need for so many paper documents that are at times out of date.

4.3.2. Dispatch Staff

On-duty reviews with the dispatch staff were very rewarding and their comments showed a real willingness to serve their two 'customers', the citizens of Toronto and Toronto's fire fighters.

They are clear about the need for speed and accuracy but were largely unaware of the existence of external standards of service that defined these criteria. This is not a major problem, as the NFPA standards were discussed early in the QA review and the resulting awareness of these should allow for a greater level of support for the quality assurance process.

Staff also pointed out a second issue and that was the lack of complete consistency across each of the four operational shifts. This clearly is not an error of commission, but rather one of omission and results from the structure that has the dispatch staff aligned as four largely discrete sections. There is of course some inter-shift operation with members working overtime however the lack of consistency needs to be corrected with each of the four shifts operating completely from the same playbook.

There is no disagreement about this, and the ways to address this include the addition of training staff at the level of a supervisor (Captain) to train members of each of the four shifts on the standard method of operation that is to be developed. At the present time there is no one individual that spans each of the four shifts, as the District Chiefs, who are ultimately responsible for the crews, are permanently aligned with one of the four shifts.

4.3.3. Fire Suppression

Reviews with fire suppression included meetings at a number of fire halls with personnel to understand the inter-relationship between fire operations and communications. Based on these meetings it was clear that each relied upon the other to a great deal and were respectful of the role each other played in the management of fire and medical emergencies.

It is also fair to say that the inter-relationships are evolving. One example of this is the participation by Platoon Chiefs with the strategic planning and other meetings related to the communications division. During these, the operational personnel have increased their understanding and respect for the dispatch function and will now be taking on an enhanced role during multiple alarms and other emergencies.

The operational supervisors have also provided valuable input to the dispatchers in terms of the additional information they are seeking to receive during field operations including such items as time checks that aid in calculating the point at which a structure may become unsafe for fire operations.

5. Quality Assurance

5.1. Introduction

Emergency dispatch services provide life critical, time-impacted services which are integral to successful and effective responses by fire, police and emergency medical services (“EMS”). Timely and effective dispatch services can make the difference between a life saved and one that is lost and they provide vital support for both emergency responders in the field and members of the public who are seeking help. Various dispatch agency models exist, ranging from single to multiple agency dispatch services, and with or without providing PSAP²⁵ services. Whether an agency dispatches one emergency service or three (or more), however, the need to deliver timely, high quality services has never been greater.

The need to meet ever higher standards of service makes it imperative that each dispatch agency regularly measure and assess its performance and underlying processes. Only by so doing, will it be possible to ensure that the needs of the emergency responders and the public are being fully met. A formal quality assurance/quality improvement program is critical to ensuring that a dispatch agency is meeting the needs of its emergency responders and the public.

Quality assurance and quality improvement programs are principally intended to address organization-level issues. They are not intended to correct individual employee performance, which is properly the role of a performance appraisal system.²⁶ Implementing a quality assurance program requires that the agency have in place established standards and procedures: the level of service, and manner of its delivery, need to be documented, measurable and understood by the dispatch agency’s staff. Absent well understood targets and standardized processes, it will be very difficult to determine whether the organization is meeting its service goals. The performance of the organization then needs to be regularly measured against those standards.

²⁵ Public Safety Answering Point or 9-1-1 call taking services.

²⁶ Candice Solie, “The Myths of Quality Assurance (QA)”, a reprint from the Public Safety Communications/APCO Bulletin, accessed at <http://www.pei-911.com/articles/MythsofQAArticle.pdf> (the reprint is not paginated: page references are to a printed out version). The two can, of course, overlap. Something missed by the performance appraisal system may be discovered in the Q/A process, which must then be fed back into the performance appraisal review. This issue will be discussed below.

A quality improvement program seeks to apply the results gathered from the quality assurance reviews. Quality improvement efforts should recognize successes, and address areas where challenges have been detected. If the quality assurance reviews are revealing problems, a dispatch agency needs to be prepared to examine its technology, its physical environment and its organizational processes and systems (from its written operating procedures and call-handling protocols, to its staffing levels and how staff is hired, trained, scheduled and supervised).

The following principal issues need to be considered when establishing a quality assurance/quality improvement program:

- Establishing and agreeing formal standards and procedures;
- Establishing a quality assurance review process; and
- Using the information to improve training, processes, equipment and outcomes.

5.2. Establishing Standards and Procedures

Before implementing a quality assurance program, a dispatch agency needs to adopt formal standards against which performance can be measured and written procedures which guide staff and management to achieving those standards. These standards can be broken into three general categories: time, procedures and protocols, and organizational. Each of these is considered below.

As quality assurance and quality improvement are as much the responsibility of staff as management, it is critical that, when standards are introduced or revised, staff (and union, where applicable) input be obtained. Unless the standards are understood and accepted, the results are likely to be disappointing.

5.3. Time Standards

The goal of a dispatch agency is to dispatch the correct units as quickly as possible with the information they need to respond to the particular emergency. Speed is an essential component of this formula: time lost on call-handling cannot be regained. From the perspective of the public, the issue is how long it takes an emergency unit to arrive on scene, not the technicalities of how different emergency agencies interact.

A dispatch agency needs to adopt formal time standards for the various components of its dispatch operations if it is to properly assess and improve the quality of the services it delivers. Those standards should include:

1. Time to answer the phone; and
2. Time to dispatch.

An agency that is acting as a PSAP also needs to measure the time it takes to hand off the call to the appropriate emergency dispatch agency.

A review of the literature shows that there are a number of different standards for these various steps, depending on the emergency agency being dispatched. The most comprehensive is probably that published by the National Fire Protection Association (the “NFPA”) in NFPA 1221 – “Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems” (2010 edition). Although NFPA standards are aimed largely at the fire services, NFPA 1221 is intended to apply to dispatching for all emergency services (including EMS and police).²⁷

NFPA’s time standards are as follows:²⁸

Call answer:

- 95% of calls answered within 15 seconds
- 99% of calls answered within 40 seconds

²⁷ It is worth noting that, since the 2002 edition, NFPA 1221 has required communication centres to establish “a quality assurance/improvement program to ensure the consistency and effectiveness of alarm processing.”

²⁸ NFPA 1221, sections 7.4.1 and 7.4.2.

Dispatch:

- 90% of emergency call processing and dispatching to be completed within 60 seconds
- 99% of call processing and dispatching to be completed within 90 seconds.

An exception is made for police dispatch, where the NFPA leaves it to the “authority having jurisdiction” to determine the time frames allowed for completion of dispatch.²⁹

NFPA 1221 also specifies answer and call handling times for agencies such as Toronto Police Services, which act as PSAPs. PSAPs must transfer calls they receive to the appropriate emergency services agency within 30 seconds, 95% of the time. The call answer times noted above also apply to a PSAP.

Other sources have mandated different times. In Ontario, in the context of EMS dispatch, the proposed dispatch time for “Code 4” calls is a maximum of 120 seconds 90% of the time.³⁰ In the District of Columbia, the call answering goal of the PSAP is to answer emergency calls within 5 seconds, 90% of the time,³¹ while in Pennsylvania, the goal is to answer all calls within 10 seconds, 90% of the time. Pennsylvania also sets a time standard of 60 seconds, 90% of the time for acquiring pertinent information and “assigning the appropriate response”. However, they leave it up to the individual dispatch centres to establish a time standard for the actual dispatch of units.³²

The crux of the issue, however, is that an appropriate standard needs to be established. In general, subject to accuracy and completeness of information, shorter is better. The NFPA,

²⁹ NFPA 1221, section 7.4.3. The implication, though, is that a standard does need to be established.

³⁰ See: “Land ambulance response time standard” on the Ontario Ministry of Health and Long Term Care website at: www.health.gov.on.ca/english/public/program/ehs/land/responsetime.html#ambulance_dispatch accessed on 11 March 2009. See also Regulation 257/00 of the *Ambulance Act* (Ontario), Part VIII, section 24. The requirements stipulated in the regulations are less clear than those advertised on the Ministry of Health’s website.

³¹ Office of the District of Columbia Auditor, “Auditor’s Examination of Public Safety Call Center’s Response to Reports of a Fire at 1617 21st Street NW on January 15, 2003”, published September 26, 2003, at page 8. (cited hereafter as “DC Auditor’s Report”).

³² Pennsylvania Emergency Management Agency, “9-1-1 Performance Review and Quality Assurance Standards”, § 120d.105 (a)(1), (a)(6) and (b)(1). Pennsylvania also has legislated that dispatch agencies must perform quality assurance reviews to the prescribed standards of performance. Cited hereafter as “PEMA QA Standards”.

which operates through a consensus process, provide a good touchstone and an excellent, if challenging, goal.³³

5.4. Procedures and Protocols

Each dispatch agency requires thoroughly documented procedures and protocols for its call taking processes. Written operating guidelines are essential for guiding staff, controlling operations and ensuring consistency. NFPA 1221 stipulates that there should be standard operating procedures for all standardized procedures which a call taker is to perform without direct supervision.³⁴

Protocol-based call answering systems, such as those developed by the National Academies of Emergency Dispatch (“NAED”), are common in emergency medical dispatch. Indeed, some jurisdictions, such as Pennsylvania, have mandated that their dispatch centres must use a system of emergency medical dispatch protocols (although they leave it to the individual centre to determine which set to use).³⁵ Similar commercially-developed protocols are also available for police and fire dispatch, though their use seems less widespread.³⁶

Regardless of whether an agency uses commercially prepared or locally developed protocols, the aim is to ensure that calls are answered consistently and correctly: the appropriate information needs to be gathered to enable a correct situational assessment, unit selection and dispatch. With EMD calls, the protocol systems are designed, among other things, to enable dispatchers to provide some initial assistance to the caller, as well as to “gate the calls”, so that

³³ A report by the US Federal Emergency Management Agency on the development of a regional communications centre in Alameda County, California, noted: “For [the agency], NFPA 1221 serves not only as a design specification but also a performance management tool”. See: FEMA, “NIMS Standards Case Study: Emergency Dispatch in Alameda County, CA” (August 2008), at p. 3.

³⁴ NFPA 1221, section 7.4.14(1).

³⁵ PEMA QA Standards, § 120d.105(d). Alberta Health Services (“AHS”) is implementing a similar requirement as it works to consolidate EMS dispatch in the province of Alberta. In that case, AHS has stipulated a preferred set of emergency medical dispatch protocols.

³⁶ The relatively new Washington D.C. Unified Communications Center has indicated in its planning for 2009 that it will be implementing the NAED ProQA protocols for police and fire dispatch. They are already using the comparable NAED protocols for emergency medical dispatch. The Office of Unified Communications, “FY09 Performance Plan,” accessed on 11 March 2009 at: <http://capstat.oca.dc.gov/Pdf.aspx?pdf=http://capstat.oca.dc.gov/docs/fy09/OUC.pdf> .

the highest priority ones (e.g., not breathing, heart attack etc.) are dispatched as soon as possible.

5.5. Organizational Issues

Quality assurance and quality improvement, properly implemented, go beyond a mechanistic periodic review of call tapes and related data. These twin processes need to be imbued in the culture of the dispatch agency. In addition to reviewing the performance of its call handlers, dispatch agencies need to undertake regular (if less frequent) assessments of the organization itself. An agency needs to have written procedures relating to all aspects of its operations, including:

1. Clear job criteria and qualifications;
2. A well defined training program – for both new and existing employees;
3. A clear staff performance appraisal system, which utilizes both formal reviews and consistent, regular supervision (and where necessary, correction) of the dispatchers' work;³⁷
4. A clearly developed strategic plan, which sets out the vision for the organization, covering major issues such as technological and infrastructure improvements, service delivery changes and improvements and similar goals;
5. A documented understanding of the needs of the emergency services that are the "clients" of the dispatch agency. This understanding ideally would take the form of a service level agreement, and should include agreed procedures and protocols for handling different types and scales of emergencies;
6. Documented protocols with PSAPs and other dispatch agencies, to ensure the most efficient handling of different call types; and
7. For EMS dispatch agencies, the protocols in use require regular review by their medical oversight directors.

In general, these organizational underpinnings need to be examined and reviewed at least annually to ensure that, as an entity, the agency is operating effectively.

³⁷ Solie, "Myths of Quality Assurance" at p.2, does an excellent job of distinguishing between performance appraisal and quality assurance. She notes that the former "defines the performance standards for the position and provides the basis for documenting employee performance in relation to these standards".

5.6. Quality Assurance Review Process

The quality assurance review process needs to be well defined, regular and understood by both staff and management.

There are three types of reviews that need to be factored into a comprehensive quality assurance program. First, there should be a regular assessment of the average call handling times for the organization. This involves a review of aggregated data and provides an overview of how the agency is performing. Depending on local requirements and size, the reviews of call handling times should be conducted at least monthly on an organizational level, to conform with NFPA 1221 requirements.³⁸

The second type of review is more intensive, and involves a consideration of the performance of each individual operator, including an examination of radio transcripts. These will likely occur less frequently (perhaps quarterly or semi-annually). That being said, local regulations may stipulate the timing and content of any review,³⁹ and those using commercially developed call answer protocol systems should integrate the compliance reviews recommended by those systems with their overall quality assurance program. Individualized reviews should be supplemented with random audits of a specified number of calls (for larger centres, this is usually set at 1 – 3% of the total calls depending on volumes, while for smaller centres, it is a specified minimum number, regardless of total call volumes).⁴⁰

There is an open question as to whether the auditing of a particular employee's calls should be entirely random, or selective (i.e., ensuring that for each call taker, to the extent possible, at

³⁸ NFPA 1221, sections 7.4.1.1 and 7.4.2.1.

³⁹ The PEMA QA Standards set out a comprehensive review requirement that must be adhered to by dispatch agencies in Pennsylvania. See § 120d.104.

⁴⁰ Pennsylvania has prescribed that its call centres must audit a random sampling of 2% of their calls, provided that in smaller centres, a minimum of 10 calls per week are being reviewed. They recommend a weekly review, but permit a monthly cycle provided the minimum number of calls are reviewed. In addition, "a segment of each telecommunicator's radio activity" must be reviewed semi-annually. PEMA QA Standards, § 120d.104(b) and (c). Accreditation with NAED for their protocol-based system requires a minimum of 25 cases per week be audited for small centres (less than 43,334 calls per year), 3% of calls be audited by centres with between 43,334 – 500,000 calls per year; and between 1- 2% for larger centres.

least one call of each type is considered during the period).⁴¹ The issue is even more complicated in multi-service dispatch agencies, where dispatchers may be cross-trained and in the course of any review period, have been involved in the dispatch of the three major emergency services, as well performing PSAP duties.

The third type of review that needs to be undertaken is where there has been a major incident (as that concept may be defined by the agency involved – it could be that there has been a significant loss of life, or substantial property damage, a certain level of resource utilization, or some combination of such factors). This third type of review does not pre-suppose that there has been a communications centre problem. Rather, it is designed to ensure that the processes and protocols in place worked in circumstances where there was a challenging event or where resources were stressed. This is akin to a debriefing, which helps identify existing strengths (what worked), as well as potential weaknesses that could give rise to problems in the future. An emergency communications centre cannot rely on luck to see it through a major crisis.

5.7. Call Handling Times

At a minimum, the time it takes to answer the call and the time it takes to dispatch units both need to be measured. Some organizations may also set intermediate time standards for certain call types or information gathering. For example, in the Ontario system, emergency medical call-takers are required to have gathered a certain level of information within 45 seconds, 90% of the time, even though the actual dispatch time is set at 120 seconds.⁴²

⁴¹ Alicia Ihnken, "Stop Problems Before They Happen: The Importance of an Effective Quality Assurance Program," Public Safety Communications (November, 2006), 48 – 52, at 49. Ihnken notes that "Methods for pulling calls for review can include completely random, 9-1-1 only, only non-emergency, only traffic stops, only chest pain calls" or some combination of different call types.

⁴² See: "Land ambulance response time standard" on the Ontario Ministry of Health and Long Term Care website at: www.health.gov.on.ca/english/public/program/ehs/land/responsetime.html#ambulance_dispatch accessed on 11 March 2009. During the initial 45 seconds, the following information is required to be gathered or assessed: location, call back number, problem/nature of EMS request, urgency, whether there is a need for a tiered response or additional emergency resources, whether there is a need for first-aid instructions and hand-off to the dispatcher. The latter suggests that the Ontario system is predicated on a horizontal call-taking model, where the initial call taker hands off the call to a separate dispatcher, while continuing to gather information from the caller.

For most major dispatch agencies, the call times are readily obtainable from the existing CAD and RMS systems. If a dispatch agency is operating without such resources, a direct observation will be required to provide baseline data for an audit.

To ensure accuracy and usable data, it is important that the timing devices used by the dispatch agency are synchronized. NFPA 1221 requires that the clock for the agency's main record keeping device be synchronized weekly to universal standard time and that all timekeeping devices in communications centre be maintained within +/- 5 seconds of the main clock.⁴³ This is not a trivial issue. A 2005 report on emergency dispatch centres in Vermont noted that:⁴⁴

"None of the Dispatch Centers comply with this [NFPA] requirement. Computer records and voice recording logs are not synchronized and may show considerable disparity. [...] *It is possible for the dispatch log to indicate that help was sent prior to the E9-1-1 call being received.* This lack of internal synchronization can be further compounded when calls are answered at one Center and transferred to another Center and acted upon.

This lack of an accurate time standard and reference for synchronization exposes each agency to liability in litigation risk that could be easily and economically corrected."
(emphasis added)

In the State Auditor's report on a particular call handling incident involving the Washington, D.C. Metropolitan Police and Fire Departments,⁴⁵ these types of problems were manifest. The auditor noted that there were inconsistencies between the various available time records, that made reconciling the data extremely difficult. While some of the sources were external to the call centre and dispatch agency, it was clear that there were internal time inconsistencies as well.⁴⁶

⁴³ NFPA 1221, sections 7.5.1 and 7.5.2.

⁴⁴ Macro Corporation, Vermont Department of Public Safety and Vermont Communications Study Group: Dispatch Services Final Report (September 2005) at pp. 4-4 to 4-5.

⁴⁵ At the time, the Metropolitan Police Department handled 9-1-1 call taking, and was required to hand off calls to the appropriate dispatch agencies, in this case the DC Fire Department.

⁴⁶ See DC Auditor's Report, at pp. 5-6.

NFPA 1221 also requires dispatch agencies to record:

1. Each unit dispatched;
2. The time of dispatch acknowledgment by each responding unit;
3. The enroute time of each unit;
4. The arrival time of each unit;
5. The time of patient contact (if applicable); and
6. The time each unit is returned to service.⁴⁷

In conjunction with the relevant emergency agencies, the dispatch agency also should be tracking the total dispatch time (from receipt of the call at the PSAP through to arrival on-scene by the appropriate emergency crews). These results should be shared with the client emergency agencies as part of a regular review process with them. Such data will help identify potential issues with existing technology, protocols, emergency vehicle locations and staffing that may be adversely affecting overall service delivery to the public.

Similarly, where a dispatch agency receives its calls from a separate PSAP, the two entities should regularly be reviewing the call-handling times and procedures to ensure that the “front-end” time is as short as possible and that notification of the appropriate dispatch agency is occurring. Where coordination is required between different emergency dispatch agencies (so, where a call is routed from a PSAP to (say) an EMS dispatch agency, but also requires responses from fire and police which are separately dispatched), the agencies involved need to ensure that they are regularly reviewing their protocols and performance, and seeking appropriate technologies and processes to reduce collective response times.

It is worth reviewing the potential timelines of an emergency call, to illustrate the need for this coordination (and why it should be included as part of an overall quality assurance review by each participating agency).

⁴⁷ NFPA 1221, section 7.4.7.

5.8. Hypothetical Scenario

There is a single PSAP, operated separately from the emergency services. Dispatch for police, fire and EMS are handled separately by the respective emergency agencies. A call is received at the PSAP, and the caller asks for “Ambulance.” The call is transferred to ambulance, and pick-up is confirmed by the PSAP. The ambulance dispatcher processes the call, which is for an injured individual trapped in a car. The car is overturned and leaking fuel on a major highway. For this example, assume that under existing protocols, this call type requires both a fire and police presence. The ambulance dispatcher must now contact both the fire and police dispatchers, provide the necessary details, and obtain a dispatch of these services. Depending on the technologies and protocols in use, the time lost by having to transfer back to the other agencies can be material.

Below is a simple time map, using the optimum NFPA standards (where available) as the basis for calculations.

Time Map of a Hypothetical Event involving Multiple Agencies

Event	Time	Running total
Time between accident and call	Unknown	
Call to PSAP – answer time	15 seconds	15 seconds
Call assessment and hand-off to EMS dispatch by PSAP as requested by caller	30 seconds	45 seconds
Call answer by EMS Dispatch	15 seconds	60 seconds
Call assessment and dispatch by EMS Dispatch	60 seconds	120 seconds (EMS now dispatched)
Time to place call by EMS dispatch to Fire Dispatch	Unknown	120 + seconds
Call pick up by Fire Dispatch	15 seconds	135+ seconds
Call assessment and dispatch by Fire Dispatch	60 seconds*	195+ seconds (Fire now dispatched)
Time to place call by EMS dispatch to Police Dispatch	Unknown	195++ seconds

Event	Time	Running total
Call assessment and dispatch by Police	Not stipulated by NFPA. Say 60 seconds.	255++ seconds. (Police now dispatched)

Note: the + and ++ signs means a delay of an uncertain amount.

In the above scenario, it will be better than 3 minutes from when the caller contacted 9-1-1, before the Fire Department receives the call and is dispatched, and more than five minutes before the police receive the call and are dispatched. In practice, the times could be significantly longer than this. Given the criticality of shortening on-scene arrival times by emergency crews, inter-agency coordination is essential and must be included as part of any quality assurance review. Technological solutions such as CAD→CAD interfaces exist which can materially reduce the times for multiple dispatch situations, but those solutions and the protocols that support them must be agreed between the different agencies. They also must be reviewed regularly and revised based on operational results.

5.9. Adherence to Call Answering Procedures

The second aspect of a comprehensive quality management process is regular, periodic reviews of a selection of calls. As suggested above, the approaches vary between individualized and specific reviews, and random reviews across the organization, or some combination of the two. For a large call taking centre, undertaking the random reviews can involve reviewing as many as 30,000 or more calls per year.⁴⁸ It may be possible to integrate these reviews with the individual reviews that also need to be conducted (so, only conducting additional individual reviews for a particular employee to ensure that an appropriate number and cross-section of his or her work has been sampled).

The approach being taken for the individualized reviews needs to be clearly understood by both the staff and the reviewer. The call types being reviewed, the forms being used, what the reviewer is looking for – all of these factors should be clearly set out for all involved.

Each agency should establish a review template based on their established protocols and the type of call. A sample template can be found on the APCO website.⁴⁹ The sample appears intended for a medical call, but it offers a good insight into the types of issues to be considered when designing such a document. The sample breaks the call review into four equally weighted sections:

- All Callers Interrogation and Communication Skills
- Caller Interrogation
- CAD Entry
- Pre-arrival Instructions.

⁴⁸ E-Comm, the regional communication centre for southwestern British Columbia, which acts as PSAP, and handles both police and fire dispatch, has a call volume in excess of 1,000,000 calls/year. The new Washington D.C. Unified Communications Center, which opened in 2006, handled some 2.6 million calls its first year. In their FY09 plan, the Washington Communication Center stated that they are intending to have each of their supervisors review 150 calls/month on average, as part of enhancing their existing quality assurance efforts. There were no details, however, about the total number of calls expected to be reviewed overall.

⁴⁹ The resource library on the Association of Public-Safety Communication Officials' website is found at: <http://www.apcointl.org/new/commcenter911/resource.html> . Check under "Q" for quality assurance. Website checked 11 March 2009. The samples appear to have been provided by CenCom Fire/EMS of Summit, New Jersey.

Various criteria are established under each heading. The weighting assigned to each criterion will need to be determined by the particular agency and may vary with the particular call type.

Similarly useful as a general guide are the quality assurance requirements established by the State of Pennsylvania, which have been discussed above. The Pennsylvania Emergency Management Agency has established procedures, standards and time frames for quality assurance reviews by the state's emergency communication centres. The standards are divided into "Call-taking" and "Dispatching". The review standards include:⁵⁰

- Answers the telephone quickly and correctly (within 10 seconds, 90% of the time).
- Asks and verifies the location of the incident or emergency.
- Obtains the callback phone number.
- Determines the nature of the incident or emergency and selects and assigns the appropriate response to the incident.
- Accomplishes the above tasks quickly and effectively (within 60 seconds of receipt of the phone call, 90% of the time) [etc.]

From the general areas of inquiry indicated in the PEMA document, an agency should be able to develop a more sophisticated review specific to the call types that its call takers are handling.

The individuals conducting the reviews should be experienced in call taking and supervising call-takers. They also should be well versed in the agency's standards and goals. When conducting a random selection of calls, their role is principally to identify trends that may exist – either where a process is not being followed or outcome not being achieved, or where the agency is doing well. They will also need to flag any calls they encounter which show a significant departure from the agency's accepted standards.

⁵⁰ Paraphrased from PEMA QA Standards, § 120d.105(a)

Where reviews are being conducted in relation to individual call-takers, the organization must be clear on how the reviews are being treated. In general:⁵¹

“this process should not be used for disciplinary actions. Similar to the Daily Observation Report (DOR), the QA/QI review may, however, be used for tracking performance and evaluating opportunities for improvement.”

In a similar vein, another author noted that an organization cannot rely on the quality assurance process alone to correct individual performance deficiencies. She noted that:⁵²

“...without [proper] supervisory assistance to guide and monitor the employee’s accomplishment toward correcting performance problems, the performance problems detected during the QA process may well continue and even possibly get much worse...”.

Where a negative trend is noted in the random call auditing, it is an indication of a systemic problem. The information needs to be properly assessed (to determine, for example, whether the problem is widespread, or confined to a single shift), and corrective action taken at the organizational level. This could include improved training, processes, technology, education or supervision. The results of the negative trend should be reviewed with the affected staff (which may be the entire team) as part of the effort to devise an appropriate solution.

Where a review of an individual under the QA process has shown deficiencies in that person’s performance, this information needs to be integrated into the agency supervisory system. Depending on the nature of the problem identified, it may require closer supervision, additional training or coaching or other methods of intervention. This closer monitoring, even if prompted by the QA review, is an entirely separate function (in Solice’s terms, part of the “performance appraisal” system)⁵³. Obviously, if the individual is unable or unwilling to change the problematic performance or behaviors, it may ultimately result in disciplinary action, though that is outside QA process itself.

⁵¹ Ihnken, “Effective Quality Assurance Program”, at p. 50.

⁵² Solie, “Myths of Quality Assurance”, at p. 2.

⁵³ See note above.

6. The Need for Speed

One of the principal requirements for a fire department is to provide timely response to emergency fire, rescue and medical assist events. This is in addition to the non-emergency responses such as fire inspections, public education, pre-planning and other less visible activities. The former activities are the ones with the highest profile, and the ones with the largest degree of risk to residents, property owners and responding fire fighters; for all of these, the NFPA 1221⁵⁴ standard applies.

In every sense of the expression, these are ‘mission critical’ responses and it is useful to understand the series of steps that must take place between the call for assistance by a resident and the arrival on scene of a fire department crew. Each of the steps that will be described can in most cases be analyzed to understand the total time until arrival of fire fighters using real-time data from existing systems⁵⁵. Where this data is non-existent in a CAD system, it can be measured by direct observation.

The Figure 4 that follows summarizes the processes from the point at which an incident occurs and a call for help is placed. This illustrates how the communication steps (the 9-1-1 process is shown in light blue/green, the fire dispatch is shown in orange) are gating items for the completion of response and arrival activities of the Fire service (shown in red).

⁵⁴ NFPA 1221: Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems, 2010 edition, ©National Fire Protection Association.

⁵⁵ This data would be found in computer aided dispatch or record management systems.

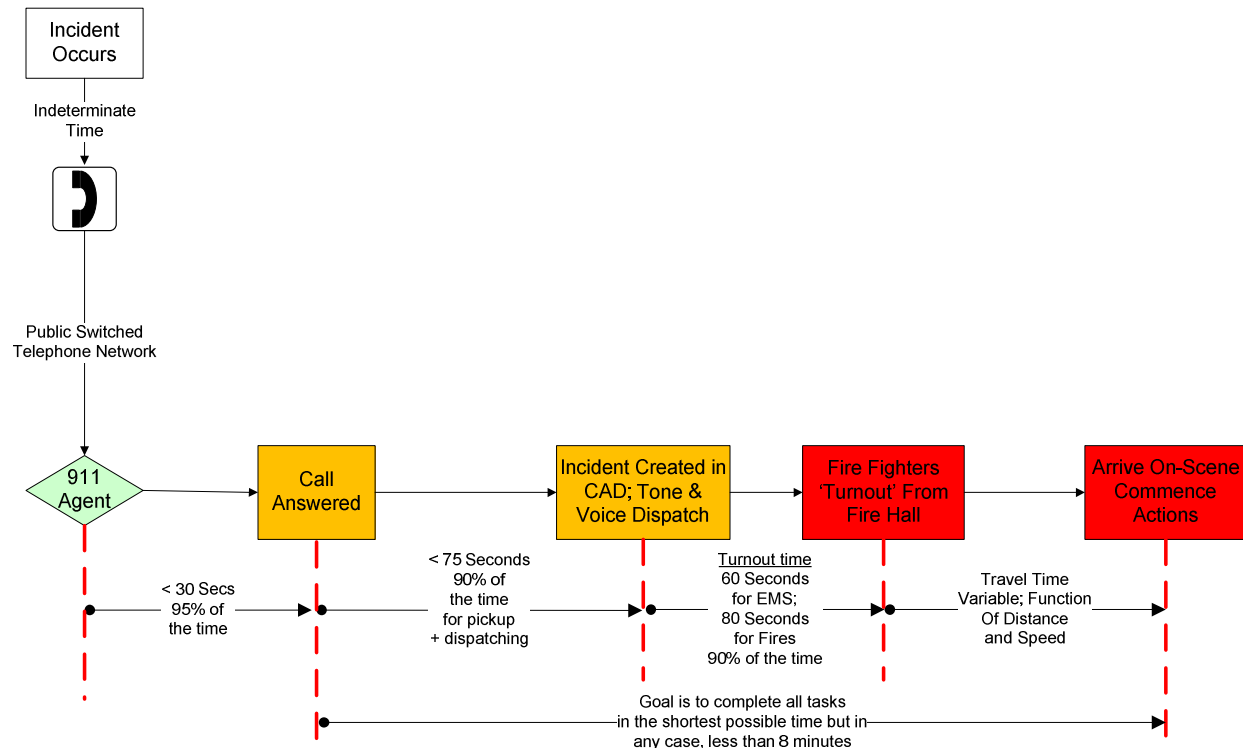


Figure 4: Event Sequence for Emergency Call Handling, Response and Arrival, with Time Lines

Each of these steps from the time the caller reaches the 9-1-1 centre, until the arrival of the fire apparatus at the scene is part of a sequence for which response time objectives have been identified. The standards of service for emergency communications in the fire service are described in the NFPA Standard 1221 as noted. NFPA 1221 provides an analysis model for key steps involved with emergency call taking and dispatch and prescribes time milestones in which these should occur⁵⁶. It should also be noted that the call management response time objectives in NFPA 1221 apply equally to the career, composite and volunteer fire services.

Figure 5 is taken from the NFPA 1221 standard, and identifies four key processes with time milestones.

1. The time to place a call to 9-1-1 and to have it successfully 'down-streamed' to the fire department (30 seconds).
2. The time to pick up, or answer the call reporting an emergency (15 seconds).

⁵⁶ NFPA 1221 additionally defines a standard with regard to business continuity, security, power and other system redundancy, CAD system operation, etc.

3. The time to interrogate the caller, determine the emergency, create a 'dispatchable' event in the CAD system and alert crews (60 seconds).
4. The time for responders to 'turnout' from the fire hall and begin their response to the scene (60 seconds for EMS calls, 80 seconds for fire calls)⁵⁷.

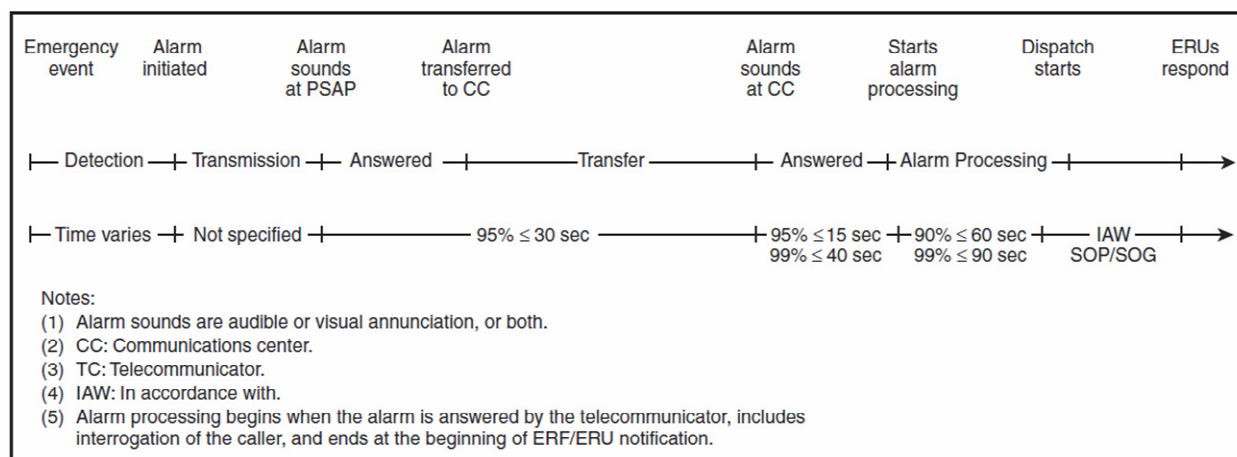


Figure 5: NFPA 1221: Emergency Call Management Analysis

In the diagram above, there are two timelines. The upper line describes the steps which occur from the moment at which the emergency event occurs, until the units respond to the incident. The lower line identifies the elapsed time at which these are expected to occur.

The overall process described above, with response time objectives can be described in the following manner.

- Emergency Event.
 - An emergency occurs (this can be either a fire or medical incident⁵⁸).
 - Until emergency services are notified in the following steps, this emergency has not yet been noticed or reported.

⁵⁷ This standard to turn out from the fire hall applies only to career units, i.e., ones that have their staffing complement 'on duty' at the time call is received.

⁵⁸ This model also applies to Police and EMS events however there are no specific defined call management metrics for these.

- Detection.
 - The emergency event has been 'detected' leading to notification of emergency services.
- Alarm Initiated.
 - At this point a call to an emergency service is placed by dialing 9-1-1, or another 10 digit number and is transferred to the PSAP⁵⁹ by the Public Switched Telephone Network (PSTN).
- Transmission.
 - In this step the PSTN makes the routing decisions and 'presents' the emergency call to the 9-1-1 primary call agent(s) at the PSAP.
 - The time for this to occur is indeterminate, though it may be measured by the telephone company; to this point emergency services have yet to be notified of the emergency.
- Alarm Sounds at PSAP.
 - This is the point at which the emergency call first begins to ring at the 9-1-1 call centre.
- Alarm Transferred to CC.⁶⁰
 - The 9-1-1 agent at the PSAP queries the caller to determine which emergency service they require and then transfers them to the call taker for that class of service.
- Alarm Sounds at CC.
 - This is the point at which the emergency call first begins to ring at the communications centre.
 - This is normally the first point at which the communications centre has the ability to begin measuring the elapsed times for call management.
- Answered.
 - This is the time frame which measures the interval between when the emergency call first begins ringing, until the call taker has begun speaking with the caller reporting the emergency.

⁵⁹ Public Safety Answering Point, another term for a 9-1-1 call centre

⁶⁰ Communications Centre

- The expectation is that all calls will be 'answered' within 15 second 95% of the time; and within 40 seconds 99% of the time.
 - This measurement equates to the time taken until the phone is 'picked up' by the fire call taker.
- Notification of TC.⁶¹
 - This is the point at which the call taker begins taking information from the caller reporting the emergency and this period of time ends when the dispatcher has completed the dispatching process.
 - The expectation is that all calls will be processed to the point at which the call has been dispatched, within 60 seconds 90% of the time and within 90 seconds 99% of the time.
 - This measurement equates to the total time taken until fire crews have been alerted and the information transferred to them.
- Alarms Retransmitted to ERF's⁶² and Response Units.
 - This marks the completion of the dispatch process and the commencement of the 'turnout phase' for the fire service. This is the interval between when dispatching has been completed and when the Fire/EMS service leaves the fire hall.
 - The expectation is that turnout from the fire hall will occur within 60 seconds for EMS responses and within 80 seconds for fire calls⁶³.
- Response Units Respond
 - This marks the completion of the turnout phase, and the commencement of the travel time which is completed when the units arrive at scene.

In summary, the expectation is that all emergency calls for service will be answered, the caller will be interrogated, the 'call' will be created on paper or in a computer aided dispatch system, and the tones and information will be sent to the responding fire fighters within 60 seconds, 90% of the time.

⁶¹ In this document TC stands for Telecommunicator; in this context it equates to the fire call taker/dispatcher.

⁶² Emergency Response Facility, in this case a Fire Hall.

⁶³ The timeframe for turnout is described in an associated NFPA Standard 1710 which describes the operation of a Career Fire Department.

The time for this measurement starts when the phone first starts to ring in the fire dispatch office, and lasts until the response information has been gathered and transferred to the emergency responders. Where an agency uses a CAD system these times are normally recorded as time stamps and thus can provide the basis for analysis.

The reason for the focus on the time required to create a call and dispatch it is well founded in the notion that emergency calls being reported to the Fire and EMS services are serious when they occur and have the capacity to significantly deteriorate in a very short space of time. This in turn requires that the initial phases—9-1-1 call taking, call assessment and dispatch—occur in the shortest possible time to insure the earliest possible intervention by emergency services personnel.

A primary mandate of any fire department is to provide for a timely response to fire and medical emergencies, as well as hazardous materials, technical rescue and other public safety interventions. In the vast majority of these, crews respond from a fire hall and travel some distance to the incident. Because these responses must occur within a relatively short time frame to minimize fire damage and save lives, effective call management is crucial. This is because emergency call management is the precursor or ‘gating’ item for Fire and EMS response to the scene.

The National Fire Protection Association (NFPA) has developed response time objectives for the North American fire service over many years and these provide applicable benchmarks. The NFPA standards are international peer-reviewed standards that address most if not all issues related to the operation of the fire service. NFPA 1710 is the standard that describes the organization and management of a career fire department⁶⁴, and defines response time objectives for the turnout of crews from the fire hall, as well as 4 minute and 8 minute expectations for arrival at any emergency incident.

The graph shown in the following figure is taken directly from the NFPA 1710 standard and demonstrates the expected fire propagation curve, which indicates the point at which a fire spreads beyond the room of origin. This is normally at or about 8 minutes from the point of ignition.

⁶⁴ This standard applies strictly to Career Fire Departments in terms of the first response vehicles.

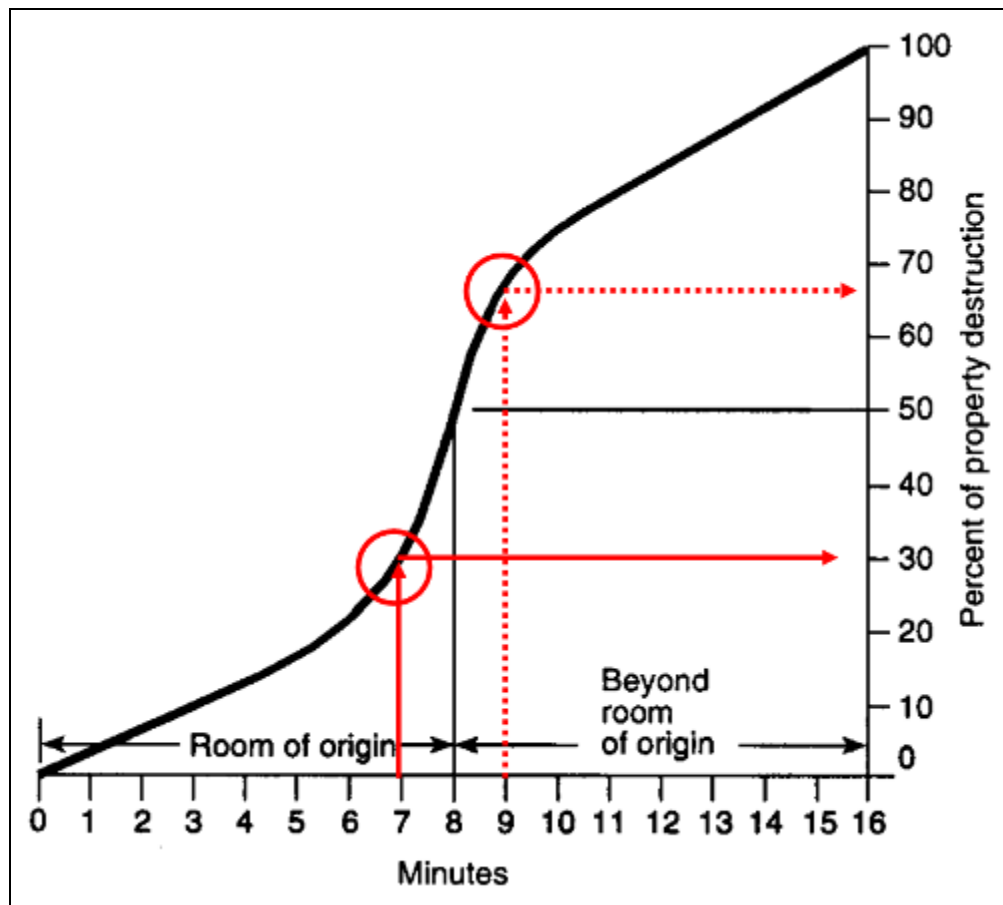


Figure 6: Fire Propagation Curve, Modeled from NFPA 1710

From this graph it can be seen that in the range of time from 7 to 9 minutes after ignition, a fire is expected to rapidly accelerate and the percentage of property destruction (shown on the Y axis) increases from approximately 30% to a little less than 70%. At some point in this short period of time, the assumption is that the fire will spread beyond the room of origin.

The significant point is that each of the steps in the fire department's response sequence, including 9-1-1 call processing, call assessment, dispatch, turnout and travel time should all occur prior to the time when a fire will extend beyond the room of origin, with a much higher risk to life and property. In this regard, the NFPA notes:

In Figure A.5.2.2.2.1, [Figure 6 above] the line represents a rate of fire propagation in an unsprinklered room, which combines temperature rise and time. It roughly corresponds to the percentage of property destruction. At approximately 10 minutes into the fire

sequence, the hypothetical room of origin flashes over. Extension outside the room begins at this point.

Consequently, given that the progression of a structure fire to the point of flashover (i.e., the very rapid spreading of the fire due to superheating of room contents and other combustibles) generally occurs in less than 10 minutes, two of the most important elements in limiting fire spread are the quick arrival of sufficient numbers of personnel and equipment to attack and extinguish the fire as close to the point of its origin as possible⁶⁵.

The key element going forward is the requirement to manage all parts of the response equation to ensure the shortest possible time for response to the public for fire and other emergencies.

Emergency responses by Toronto Fire Services have been analyzed using data from the computer aided dispatch (CAD) system⁶⁶. The data set⁶⁷ includes responses for the period of 2008.

⁶⁵ NFPA 1710, 2010 edition, A.5.2.2.2.1.

⁶⁶ The CAD system tracks the time the call was first received from the public, the time the dispatcher alerted the fire units, the time units began their response to the scene, the arrival time, etc., along with the location of the incident, the response type, and other pertinent details.

⁶⁷ The data set provided included a number of non-emergency responses, as well as incidents for which there was incomplete data that would not allow for a computation of response times. This data was groomed and the 'net' result was a total of approximately 142,000 emergency responses for which a complete set of time stamps was available. This data set is the basis for the response time calculations.

7. CAD System

Toronto Fire Services utilize a fire service CAD system⁶⁸ similar to other major fire departments⁶⁹ in Canada. This CAD was implemented⁷⁰ to accommodate the amalgamated TFS after 2000. The CAD system is somewhat behind in terms of the current version and a major system upgrade is planned for 2010.

The CAD is a 'tier one' system and is fully suitable for a city such as Toronto. The CAD system is linked to the fire halls by means of a station alerting system that provides tones and the dispatch audio; the CAD is also connected by means of wireless connection with mobile workstation units in all first-line fire apparatus.

The CAD is also capable of failing over to the backup site at Don Mills Road and this functionality is exercised regularly but is not fully functional in that mobile workstation units are not enabled with the backup system.

7.1. CAD Upgrade

Toronto Fire is beginning a plan for a major upgrade to their CAD from the 7.9.6 version to 9.0; this will probably occur in 2010. Initially the proposal was for the CAD to be upgraded without any view to changing functionality and workflow however funds have now been approved for priority changes identified in this report.

The following are a few of the more significant items to be considered.

1. The call taking screens could be configured in a much more user-friendly way to allow for task completion much more quickly. For the most part this involves configuration, not 'hard coding' and much of this can be managed in-house.
2. The CAD workstations should be expanded from two to three screens to allow for a much better use of mapping. At the present time the map is usually down-sized onto a

⁶⁸ The CAD vendor is Intergraph.

⁶⁹ These include Vancouver, Edmonton, Calgary, London and others in Canada.

⁷⁰ In 2001.

very small portion of one screen which limits the dispatcher's ability to review the locations of available units and to view nearby/adjacent calls.

3. The call taking workflow should be amended and the system reconfigured to allow for call takers and dispatchers to simultaneously amend or view an incident. At the present time this is not the case and is one of the principal reasons why call taking and dispatch may take longer than it should.
4. The fire hall alerting system should be reviewed with an option being to implement an I.P.-based system that will operate fully in parallel and complete the alerting process much more quickly than is presently the case.
5. Consider implementing a system status management system to monitor units for an unavailable status and provide a pop-up notification to the dispatchers with regard to a recommended move-up to address the shortfall.

The entire issue of the impending CAD upgrade was discussed with a working group of personnel during a site visit in 2009 and a draft user requirements document was developed. This document is being further reviewed internally and should form the basis for a revised scope of work with the vendor.

8. Record Management System

8.1. Current System

The Toronto Fire Service currently utilizes a record management system (RMS) to manage incident details and which forms a historical record of their responses. The system is provided by Zoll®, formerly Aether®, and prior to that known as SunPro® and is linked to the Intergraph CAD system with an interface. The interface transfers response information from the CAD, including the date and time the call was created, the time it was dispatched, the time that units arrived on scene, etc. into the RMS. The event information is updated from the CAD system on a regular basis, and receives a final closing amount of information when the incident ends.

The information transferred by means of the interface includes some information from the Toronto EMS CAD system which is received at the time they create the call; this information forms the basis for the dispatch by Toronto Fire. The information also includes information that is auto-populated from the Toronto 9-1-1 system which is managed by the Toronto Police Service. This information can include the calling person's name, phone number and location where this is received from a 'wire-line' phone. The information passed by the cellular system includes the phone number and name of the subscriber, but does not yet include the caller's location with precision⁷¹.

Toronto Fire does not have an RMS with pre-plan information, building construction, and similar information, and currently has no ability to link information from an external source to the CAD at the time of dispatch. In addition there is no practical way for fire crews to utilize a mobile workstation at the scene of an incident to query the system for additional, valuable information.

Instant access to building information is a feature of many contemporary systems and the lack of this in Toronto is a concern. On review it was determined that at the present time the department does not have electronic pre-plans that are available while enroute to, or at the scene of a fire or other emergency. A number of major properties have pre-plans on site that may be accessible to the members of the department, but there is no ready inventory of these that can be checked or confirmed when required.

⁷¹ Phase II wireless will have this ability and testing was undertaken during the summer and autumn of 2009 in advance of a mandatory implementation in 2010.

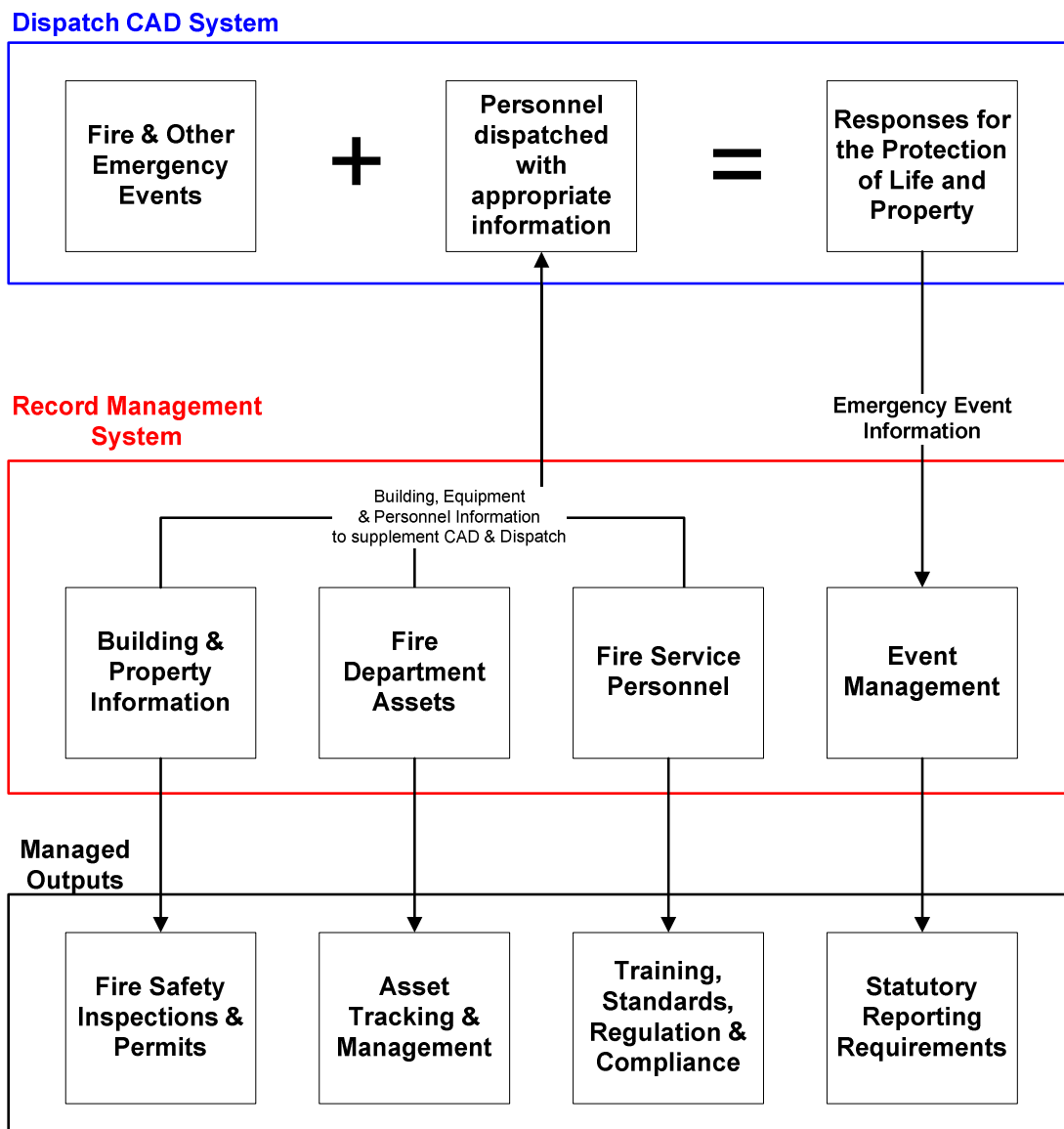
The ability to review information related to a particular property is a feature found in many contemporary fire department communication systems. Property and other information can be stored in the CAD itself, and that is the case with the Toronto Fire Service to a limited degree however there is a great deal of additional information that should be considered for either the present or a replacement RMS.

The type of information that should be available for review at the time of dispatch, or while in transit to an incident can be described in the following main categories, properties, assets and persons. These major categories can be expanded as follows:

- Properties
 - Pre-plans
 - Hydrant location and details
 - Lock box location
 - Standpipe connection
 - Gas and electrical shut off points
 - Building profile including the number of floors and any floor naming anomalies
 - Location of the fire fighter's elevator
 - Presence of a sprinkler system, including the location of any zone controls
 - Roof construction details
 - Hazardous conditions within the property including
 - Storage of flammable or explosive materials
- Assets
 - Details regarding the on-duty or spare apparatus including but not limited to pumping capacity, number and length of ladders, water capacity, presence of compressed air foam, etc.
 - Placement of all small equipment on apparatus including air bottles, generators, positive pressure fans, etc.
 - Details regarding other assets that may be available to the department including spare apparatus, etc.

- Persons
 - Details regarding the availability of specialized fire fighters, such as high angle rescue and hazmat technicians, etc.

Figure 7 shows the notional data flows and relationships between a CAD and RMS system.



9. Dispatch Analysis

9.1. Introduction

The data from the CAD system⁷² provides a number of 'time stamps' that can be analyzed and aggregated for the purpose of analysis. The following section will review each of the key steps and provide detail regarding the degree to which TFS meets the various standards for dispatch management.

9.2. Analysis

The data for the dispatch as well as response by fire fighters can be summarized in the following table. This data shows the 90th percentile for each bi-monthly grouping for the dispatch time, the 'turnout' time by fire fighters as well as the travel time to the scene.

	Jan Feb	Mar Apr	May Jun	Jul Aug	Sep Oct	Nov Dec	90th Percentile for 2008
Alarm to dispatch ⁷³	0:01:36	0:01:37	0:01:40	0:01:41	0:01:35	0:01:35	0:01:37
Add to dispatch	0:00:43	0:00:42	0:00:44	0:00:44	0:00:43	0:00:43	0:00:43
Dispatch to Ack ⁷⁴	0:01:02	0:01:01	0:01:03	0:01:02	0:01:02	0:01:02	0:01:02
Ack to Enroute ⁷⁵	0:02:07	0:02:05	0:02:02	0:02:01	0:02:02	0:02:02	0:02:03
Enroute to Arrive	0:04:40	0:04:39	0:04:42	0:04:36	0:04:39	0:04:39	0:04:39
Dispatch to Arrive	0:06:50	0:06:44	0:06:41	0:06:36	0:06:38	0:06:54	0:06:44
Alarm to Arrive	0:07:48	0:07:47	0:07:42	0:07:43	0:07:42	0:07:54	0:07:46

Table 1: 90th Percentile 2008 Dispatch Times

In terms of the call management processes, the time taken from when an incident is first recorded in the CAD until such time as the dispatcher initiates the tones and data burst to the fire halls (alarm to dispatch) is very consistent and the 90th percentile only varies by 5 seconds over the course of a year. It should be noted that this data does not include the time taken by

⁷² This data is for the period from January 1, 2008 to December 31, 2008.

⁷³ The NFPA standard of service for this work element is 60 seconds, 90% of the time.

⁷⁴ Acknowledgement by the fire crew from within the fire hall.

⁷⁵ Enroute is the time which either of two things happen; either the crew presses the enroute button on the mobile workstation in the truck or the dispatcher enters the enroute command for the unit from the dispatch workstation.

the dispatchers on the telephone prior to starting the record of the call in CAD which is estimated at 15-25 seconds.

The NFPA standard for this section is 1:00 (60 seconds) and so although the work is being performed in a very consistent manner; it takes more than 50% longer than proposed.

The data is graphed below and it illustrates a range of only 5 seconds throughout the year with the only uptick during the summer⁷⁶. The trend line is also relatively flat and is showing an improvement over the 12 month period.

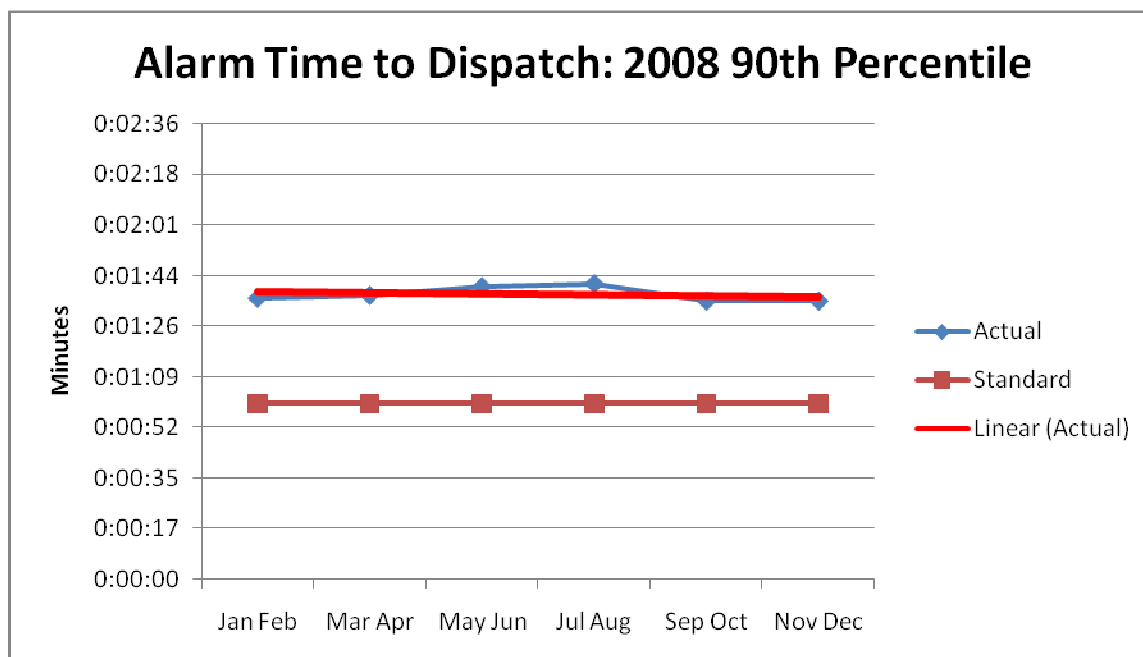


Figure 8: Alarm to Dispatch Time, 90th Percentile

The second set of data (Figure 9) illustrates the time between when the incident has officially been added to the CAD system, until the time the dispatcher actually initiates the tones and reads the information to the responding crews.

This time is a sub-set of the previous time and covers all activities to review the incident by the dispatcher, to amend the recommendation from the CAD, to identify/locate the units that will respond, etc.

⁷⁶ Knowledge of these types of anomalies in the data will come from a review of the data, and will allow TFS to search for the reason why this occurred and to better manage it.

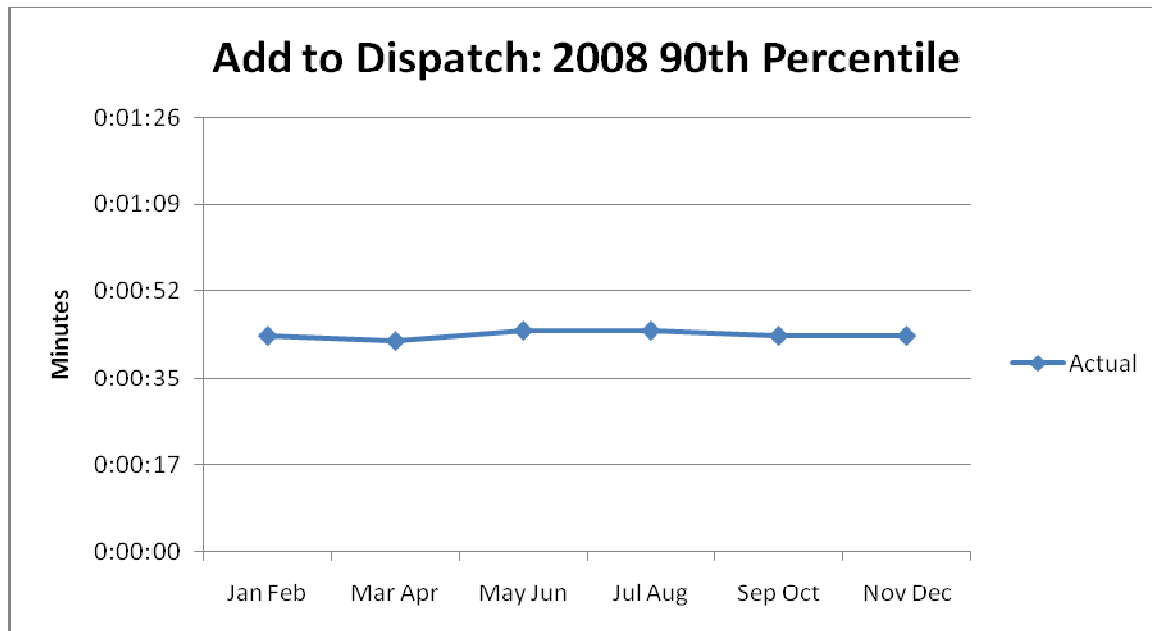


Figure 9: Event Add to Dispatch

With the exception of the July/August time period the time taken for this function is remarkably close, ranging between 42 and 44 seconds.

The next data set is that which tracks the interval between when the dispatch messaging starts, until the crew presses an acknowledge button in the fire hall, or until the dispatcher changes their status to 'acknowledge'. The 90th percentile in this case averages 62 seconds and represents the first of two steps required for the fire crew to commence their response. The second one is the interval between acknowledge and enroute.

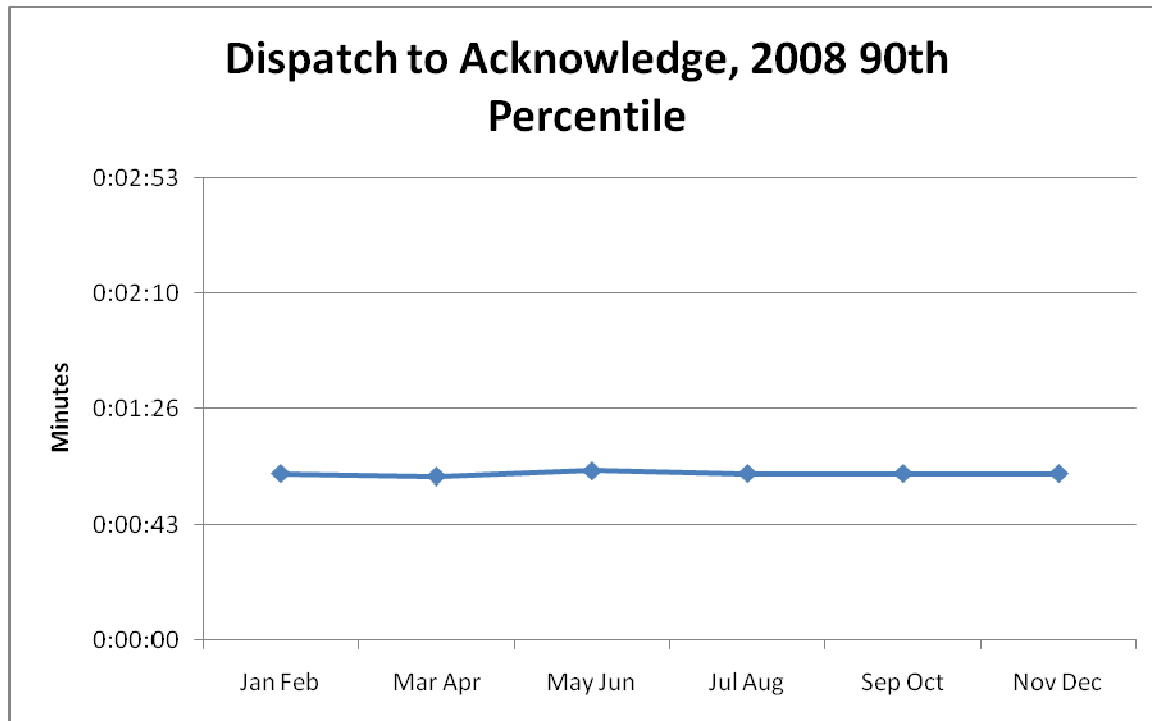


Figure 10: Dispatch to Acknowledge, 90th Percentile

The fourth data set shows the interval between when the crew presses the acknowledge button in the fire hall and when the first unit status was changed to enroute, either by the fire crew pressing the enroute button on the mobile workstation or when the dispatcher changed the status for them. In this case the 90th percentile averages 123 seconds for the 2008 data set.

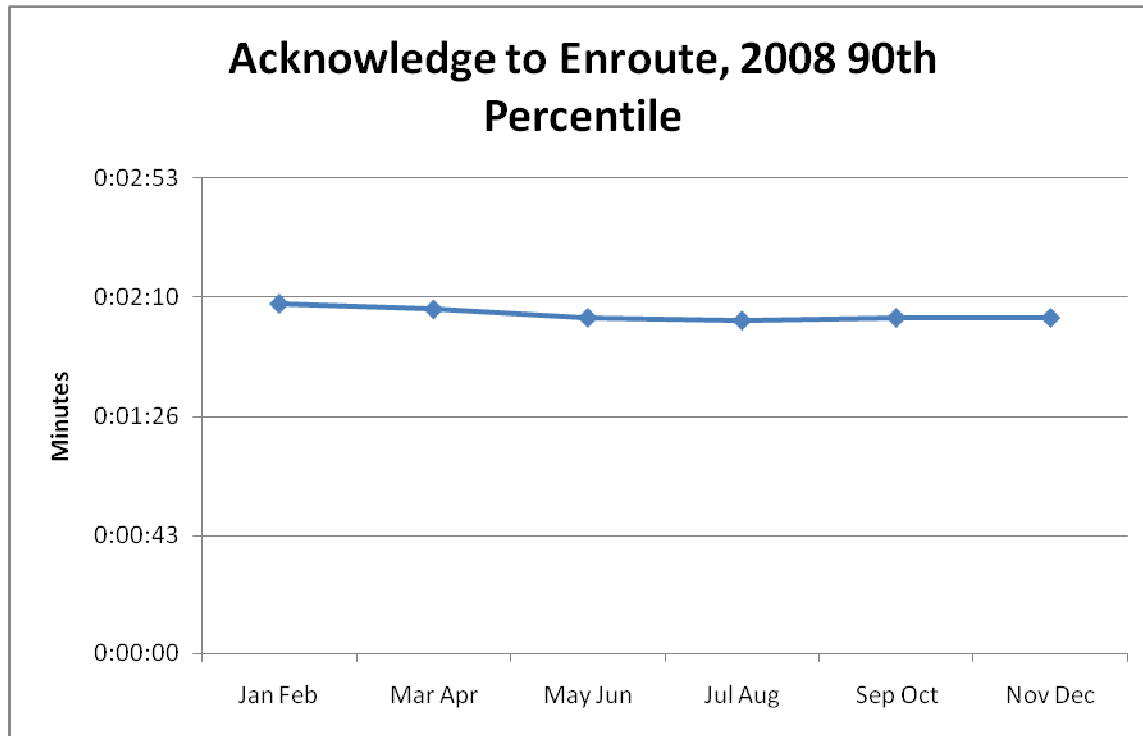


Figure 11: Acknowledge to Enroute, 90th Percentile

The expectation from the NFPA 1710 Standard is a total of 80 seconds for the sum of these two steps for responses to fire calls, and 60 seconds for EMS responses⁷⁷. For the year 2008 based on the data provided, the actual turnout time is 185 seconds⁷⁸.

The fifth series of data is travel time, which is the interval between the time the apparatus goes enroute and when it arrives at the scene. The data for 2008 is shown in the following graph and shows a consistent travel time for all units that is approximately 4½ minutes.

⁷⁷ NFPA 1710, 2010 edition, 4.1.2.1

⁷⁸ The sum of Dispatch to Acknowledge + Acknowledge to Enroute from Table 1 on page 58

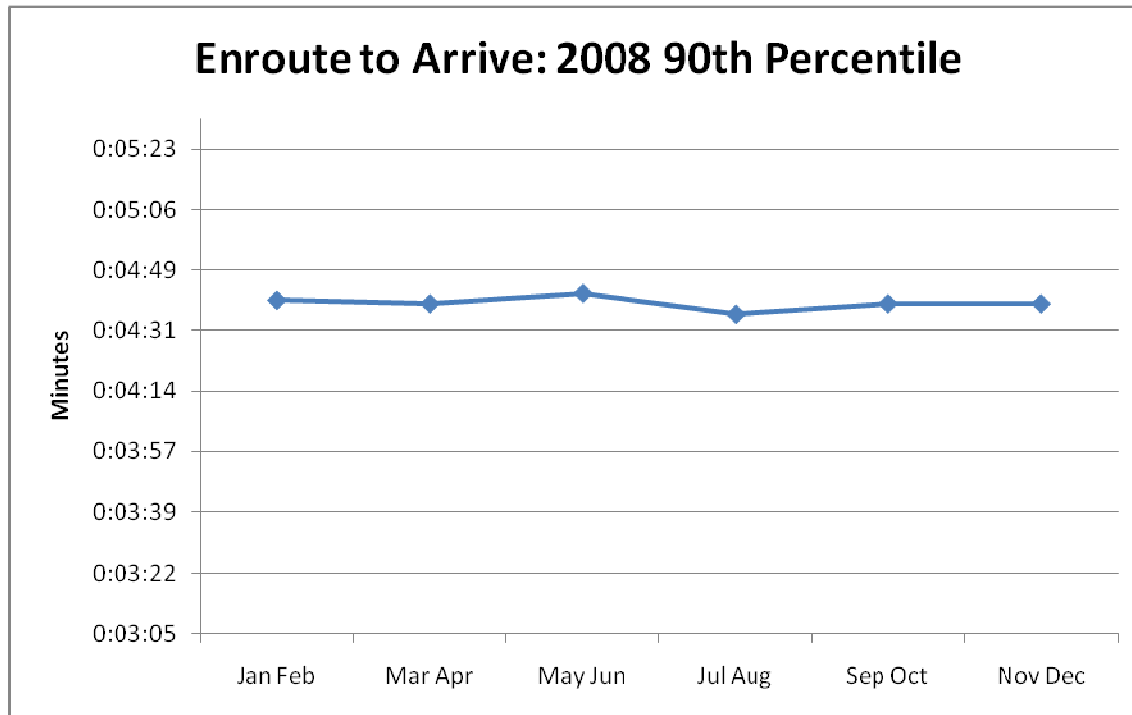


Figure 12: Enroute to Arrive, 90th Percentile

9.2.1. Work Load by Command

One issue that the data raises is the asymmetrical distribution of the workload between the four TFS commands. These are the four sections of the department for dispatch and operational purposes and the following table illustrates the call volume for 2008

	Jan Feb	Mar Apr	May Jun	Jul Aug	Sep Oct	Nov Dec	Total	Rank	Percent
North	3,832	5,688	5,828	5,676	5,813	5,774	32,611	4	23%
East	4,216	5,784	5,766	5,655	5,607	5,794	32,822	3	23%
South	5,432	7,330	7,640	7,841	7,455	7,130	42,828	1	30%
West	4,189	5,821	5,966	5,760	5,604	5,832	33,172	2	23%
						Total	141,433		

Table 2: Dispatch Workload by Command

South command comprises a significant portion of the former City of Toronto and the workload for that command is approximately 30% more than the average for the other three. The workflow for this command should be further examined, and some consideration given to providing an additional dispatcher/radio operator, at a minimum during the busiest hours of the day. The distribution of the workload by command is shown in the following graph.

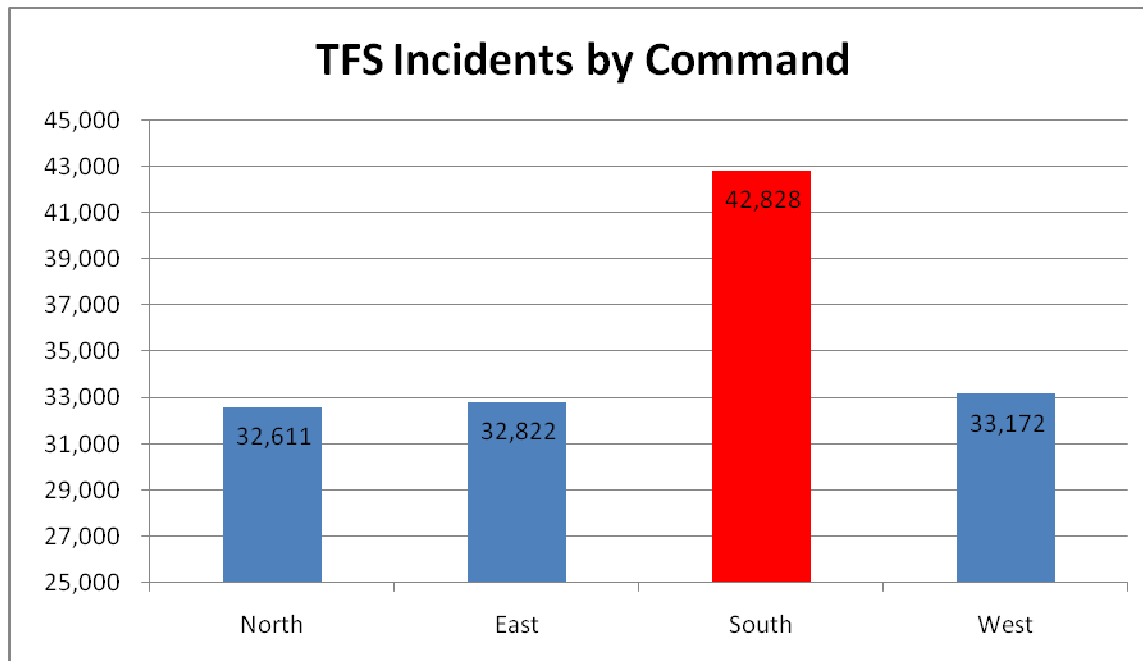


Figure 13: TFS Dispatch Workload by Command

9.2.2. Workload by Day of the Week

The dispatch data can also be reviewed to determine the distribution of incidents by day of the week and by hour of the day. This data set (table 3) shows that there is a variation of about 10% in terms of the call volume between Sunday which is the slowest day of the week and Friday which is the busiest.

	Jan Feb	Mar Apr	May Jun	Jul Aug	Sep Oct	Nov Dec	Total
Sunday	2,989	3,427	3,480	3,517	3,355	3,675	20,443
Monday	3,208	3,711	3,790	3,066	3,440	3,658	20,873
Tuesday	3,701	3,671	3,101	3,741	3,608	3,468	21,290
Wednesday	3,604	3,582	3,103	3,659	3,564	3,723	21,235
Thursday	3,627	3,264	3,701	3,630	3,632	3,001	20,855
Friday	3,687	3,293	4,175	3,707	3,668	3,208	21,738
Saturday	2,934	3,685	3,862	3,617	3,219	3,804	21,121

Table 3: TFS Analysis of Dispatch Incidents by Day

The data is also graphed as shown in Figure 14 but based on the range of 10% between the busiest and slowest, it may well argue for flat staffing by day of the week.

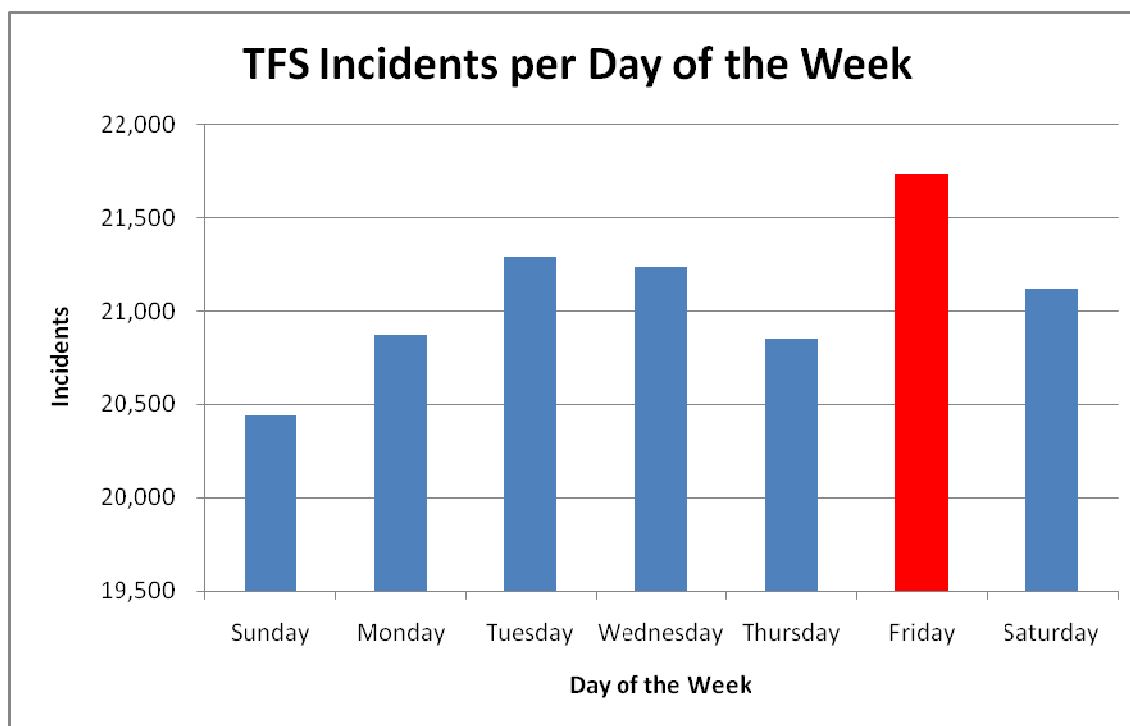


Figure 14: TFS Dispatch Incidents per Day of the Week

9.2.3. Workload by Hour of the Day

The breakdown of incidents by hour of the day results in a much more significant range. The following table shows the incidents per hour for each of the two month periods in 2008 with the four busiest one-hour periods being highlighted.

Hour	Jan Feb	Mar Apr	May Jun	Jul Aug	Sep Oct	Nov Dec	Total	Rank
0-1	805	834	870	904	842	798	5,053	17
1-2	719	650	658	666	708	694	4,095	19
2-3	638	623	627	633	640	672	3,833	20
3-4	591	600	570	576	537	527	3,401	21
4-5	506	486	431	545	497	474	2,939	23
5-6	463	483	411	478	462	474	2,771	24
6-7	580	566	531	533	501	551	3,262	22
7-8	762	757	723	753	713	686	4,394	18
8-9	1,027	1,029	1,031	963	1,044	1,031	6,125	15
9-10	1,223	1,184	1,134	1,116	1,145	1,194	6,996	12
10-11	1,234	1,282	1,335	1,269	1,266	1,283	7,669	9
11-12	1,303	1,310	1,381	1,294	1,400	1,378	8,066	2
12-13	1,224	1,401	1,407	1,250	1,307	1,358	7,947	4
13-14	1,299	1,375	1,329	1,432	1,379	1,399	8,213	1
14-15	1,195	1,283	1,385	1,403	1,221	1,285	7,772	6
15-16	1,283	1,328	1,387	1,318	1,264	1,268	7,848	5
16-17	1,170	1,305	1,392	1,174	1,347	1,228	7,616	10
17-18	1,200	1,327	1,382	1,275	1,263	1,298	7,745	8
18-19	1,248	1,352	1,387	1,340	1,315	1,385	8,027	3
19-20	1,291	1,237	1,288	1,303	1,372	1,274	7,765	7
20-21	1,146	1,212	1,194	1,325	1,146	1,178	7,201	11
21-22	1,018	1,102	1,187	1,248	1,114	1,114	6,783	13
22-23	999	1,062	1,229	1,147	1,061	1,019	6,517	14
23-24	826	845	943	992	942	969	5,517	16

Table 4: Workload by Hour of the Day

This information can then graphed as shown in Figure 15 and this shows that as might be expected, the ‘wee’ hours of the morning are the quietest, but that around 6 am the call volume rises significantly. By the noon hour, the call volume has increased by nearly three-fold and remains essentially unchanged until around 7 pm when it finally begins to decline steadily until 6 am. For this reason a revision of the staffing model should be considered to optimize staffing with workload.

There are a number of implications for the dispatch operation, one of them being that if training exercises are to take place, then the preferred time for these would be prior to noon hour.

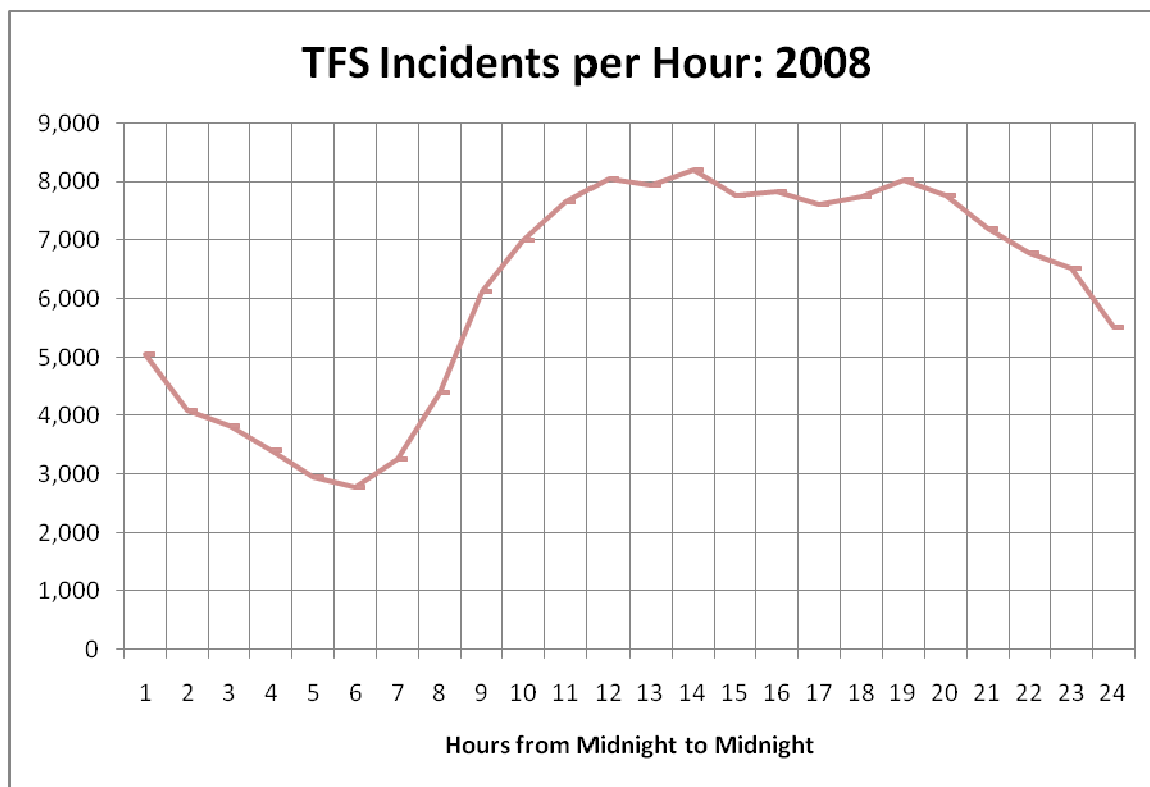


Figure 15: TFS Incidents per Hour—2008

As noted previously, the CAD system does not directly record all of the activity related to dispatch. The data element that is estimated is the amount of time taken with call taking prior to when the CAD system actually records the creation of the incident by means of an initial time stamp. This time is estimated as being 25 seconds by calculation and by direct observation and is shown in the highlighted cell in the following table.

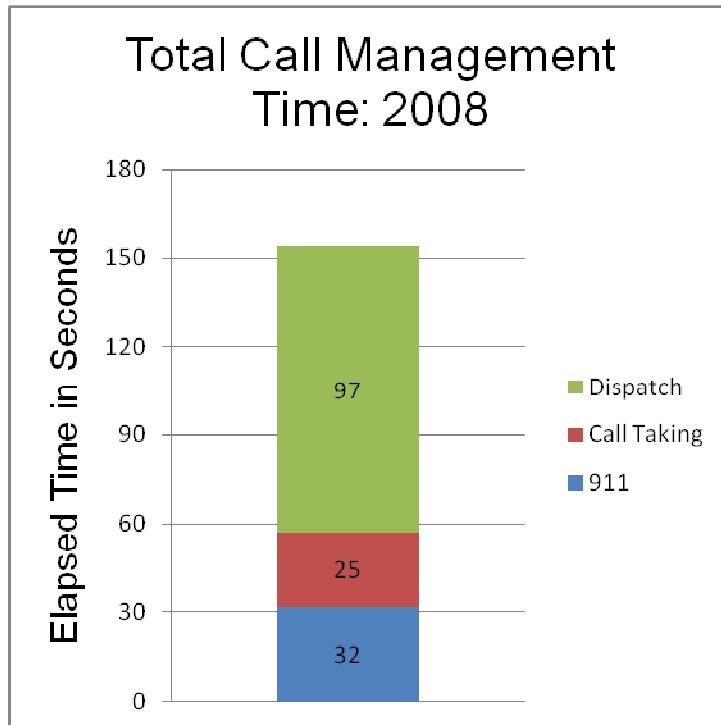
Work activity ⁷⁹	Time
9-1-1	0:00:32
**Call Taking⁸⁰	0:00:25
Dispatch	0:01:37
Total	0:02:34

Using this information which includes the 9-1-1 PSAP time + each of the times estimated and measured for Toronto Fire, we can arrive at a reasonable estimation of the total call management time.

The following graph shows each of these steps and yields a total call taking and dispatch time of 2 minutes and 34 seconds (154 seconds). This response as noted is comprised of the sum of 9-1-1 handling + call taking and dispatch.

⁷⁹ Calculated at the 90th Percentile as per the NFPA 1221 and 1710 2010 editions.

⁸⁰ Estimation based on calculation and direct observation for a small data set. Noted that subsequent review by TFS indicates this time may be somewhat longer and will be further reviewed.



The final way in which the CAD can be utilized is to understand the degree to which call takers and dispatchers complete their tasks.

For this purpose a random sample of the data was reviewed and the dispatcher's ID's were removed. This is consistent with the earlier discussion regarding the notion that quality assurance processes cannot be seen as punitive exercises. This is all the more important as the data reviewed to date is a small sample and will require further validation.

9.2.4. Call Taking Time by Dispatcher

The next table shows the dispatch times for 6 dispatchers chosen at random and assigned the I.D.'s of 1 through 6. The times shown are for an average of all of their activities over a given time period.

This data demonstrates a fairly significant range for what should be a reasonably standard task and suggests that the tasks are not being performed in the same way. This measurement is borne out by the direct observation and by the comments received from the staff. It is generally agreed that these activities are not always performed in a consistent manner and it may be that this results in such a spread in the times taken to complete the work.

Dispatchers					
1	2	3	4	5	6
0:00:33	0:00:21	0:00:33	0:00:24	0:00:25	0:00:30

The information in the table is shown in the following graph and the range of times taken for what are very similar tasks will be addressed. It is proposed that the call taking procedures be reviewed as part of the CAD upgrade and that a standard, shortest-possible method be developed that is at the same time fully consistent with obtaining all of the required information. In turn it is proposed that additional training staff should be provided to work with the on-duty staff to ensure an understanding of this requirement.

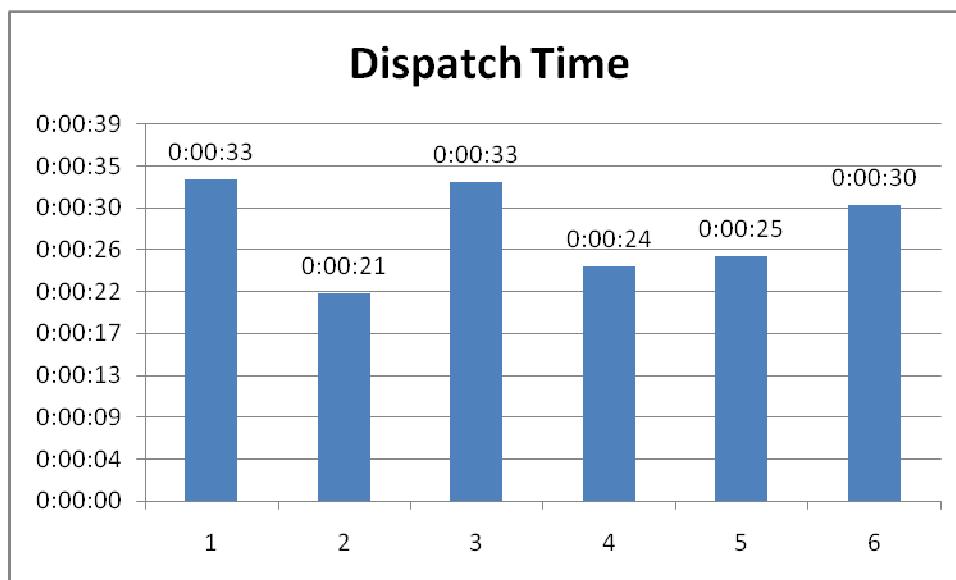


Figure 16: Dispatch Time Taken--Sample Group

9.2.5. Call Taking+ Dispatch Time

The following table contains data for the call taking + dispatch portion of the work and this likewise shows the range where the times to complete the work vary from just over a minute to more than a minute and a half.

Call takers					
1	2	3	4	5	6
0:01:22	0:01:32	0:01:09	0:01:37	0:01:13	0:01:12

It should be stressed that in no sense is this part of the review related to anything other than a need for documented standard practices coupled with training and mentoring to ensure optimal performance. This data has been graphed as shown in Figure 17.

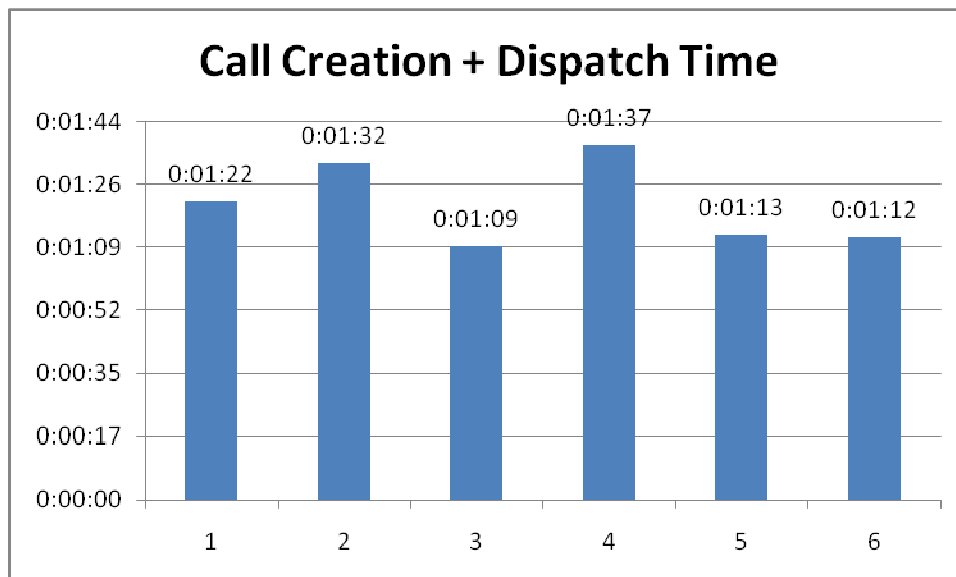


Figure 17: Call Creation + Dispatch--Sample Group

10. 9-1-1 System Data

10.1. Introduction

9-1-1 service for wire line telephones in Toronto originates with Bell Canada. Bell is the primary service provider and routes callers who dial 9-1-1 to the Toronto Police Service which is defined as the Public Safety Answering Point (PSAP). Staff at Toronto Police quickly determines which service is required and then transfers callers, in this case, to Toronto Fire⁸¹.

10.2. Standard of Service

The standard of service for this transfer is 30 seconds or less, 95% of the time as noted elsewhere in this report. This standard has been in existence since its publication by the NFPA and is well accepted as being appropriate in many parts of Canada.

10.3. Data report

The data report has been provided by Bell as of September 2008. Prior to this, it does not appear that 9-1-1 service reports had either been requested or produced. Regardless, from the point at which they were requested, they have been made available and are produced on a monthly basis in a format as shown.

Average calls statistics						
9-1-1 Call Answered at P-PSAP	9-1-1 Call Offered to S-PSAP	9-1-1 Call Answered at S-PSAP	End of Call	Time Taken to Answer at S-PSAP	Waiting Time for Caller	Total Time for Call Treatment
TORONTOFIR						
2009/03/01 0:01:36	0:01:51	0:01:59	0:04:38	0:00:08	0:00:23	0:03:02

Figure 18: 9-1-1 Data Format

The data set provided the following columns from left to right, some of which are the actual measured date and time, while others are calculated fields.

⁸¹ It should be noted that calls of a medical nature are transferred first to the TEMS which in turn transfers relevant calls to Toronto Fire by means of an electronic interface between the EMS CAD and the Fire CAD.

Data Element Label	Explanation	Measured Field	Calculated Field
9-1-1 Call Answered at P-PSAP	The actual date and time the call was answered at the P-PSAP (Toronto Police)	X	
9-1-1 Call Offered to S-PSAP	The date and time at which the P-PSAP has determined which service is required, at when the transfer to the S-PSAP (Toronto Fire) begins	X	
9-1-1 Call Answered at S-PSAP	The date and time at which the call is 'picked up' by Toronto Fire	X	
End of Call	The date and time at which the caller with the emergency is released by Toronto Fire	X	
Time Taken to Answer at S-PSAP	The amount of time between when the phone starts to ring at TFS and the point at which it is answered		X
Waiting Time for Caller	The amount of time between when the phone starts to ring at TPS, until it is answered by TFS (this is the sum of the Toronto Police call handling + the time for Toronto Fire to pick up the call)		X
Total Time for Call Treatment	The amount of time from when the caller first presents to the 9-1-1 system through the time it takes Toronto Police to transfer the caller to TFS and for the full amount of time until the caller is released		X

The following table is extracted from the 9-1-1 data provided and is summarized for the months September 2008 to April 2009 with the following headings:

1. **TFS time to answer:** the number of seconds taken for TFS to answer the 9-1-1 caller as it is being transferred by Toronto Police.
2. **PSAP Transfer:** the number of seconds to complete the transfer of the calling party to Toronto Fire; this is the sum of item 1 and 6. The NFPA goal is 30 seconds for 95% of callers⁸².
3. **Total Time w/Caller:** the number of seconds to handle the caller from the time they were first answered by Toronto Police, through the transfer and discussion with Toronto Fire, until their call was disconnected as being completed.
4. **TFS Time w/Caller:** the number of seconds the caller was connected with Toronto Fire.
5. **Transfer + TFS call handling:** the number of seconds the caller was connected with Toronto Fire + the time it took TFS to answer the call.
6. **TPS Time w/Caller:** the number of seconds Toronto Police was connected to the caller prior to the transfer being initiated.

	# of calls	TFS time to answer	PSAP Transfer Average	PSAP Transfer 95 th Percentile	Total Time w/Caller	TFS Time w/Caller	Transfer + TFS call handling	TPS Time w/Caller
Sep-08	3,031	0:00:09	0:00:31	0:00:56	0:01:31	0:01:00	0:01:08	0:00:23
Oct-08	2,616	0:00:09	0:00:31	0:00:55	0:01:31	0:01:00	0:01:08	0:00:22
Nov-08	2,562	0:00:09	0:00:32	0:01:00	0:01:33	0:01:01	0:01:10	0:00:23
Dec-08	3,110	0:00:09	0:00:32	0:01:01	0:01:36	0:01:04	0:01:12	0:00:23
Jan-09	2,804	0:00:09	0:00:32	0:00:59	0:01:34	0:01:03	0:01:12	0:00:23

⁸² Noted that two columns have been calculated, the first shows the average transfer time, the second shows the 95th percentile which is the objective in the current NFPA 1221 standard.

	# of calls	TFS time to answer	PSAP Transfer Average	PSAP Transfer 95 th Percentile	Total Time w/Caller	TFS Time w/Caller	Transfer + TFS call handling	TPS Time w/Caller
Feb-09	2,431	0:00:09	0:00:31	0:01:06	0:01:34	0:01:03	0:01:12	0:00:22
Mar-09	2,586	0:00:09	0:00:31	0:00:57	0:01:37	0:01:05	0:01:14	0:00:23
Apr-09	2,984	0:00:08	0:00:38	0:01:33	0:01:41	0:01:02	0:01:12	0:00:29

Table 5: 9-1-1 Call Data Summary

The PSAP transfer time (item 2 above) and the Toronto Fire Services time to answer the call (item 1 above) can be graphed as follows. This shows that the average time to answer and transfer the call by Toronto Police to Toronto Fire is consistently at or near 30 seconds but is nearly double the 95th percentile objective, with the exception of April 2009.

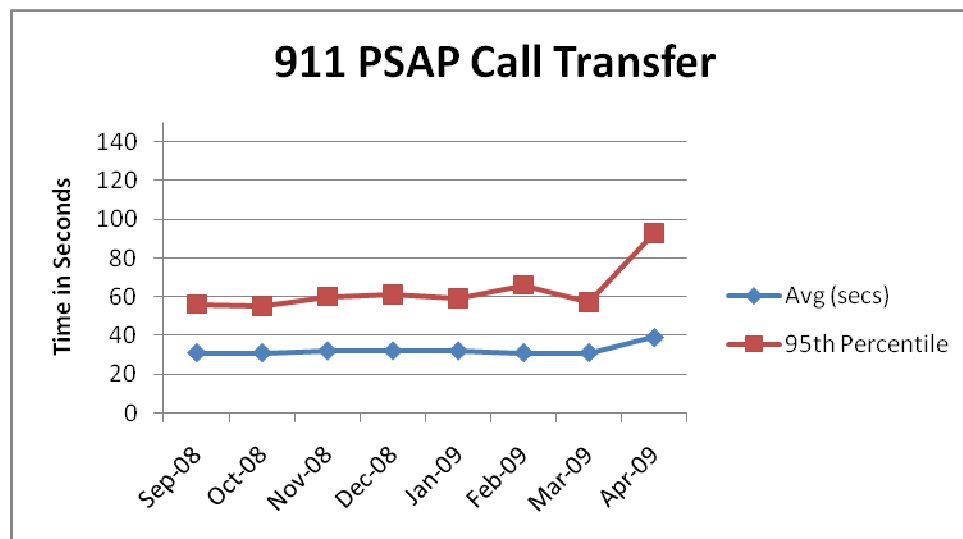


Figure 19: 9-1-1 Transfer Time

The data also shows that the TFS dispatchers are answering the transferred call slightly more quickly as shown in Figure 20.

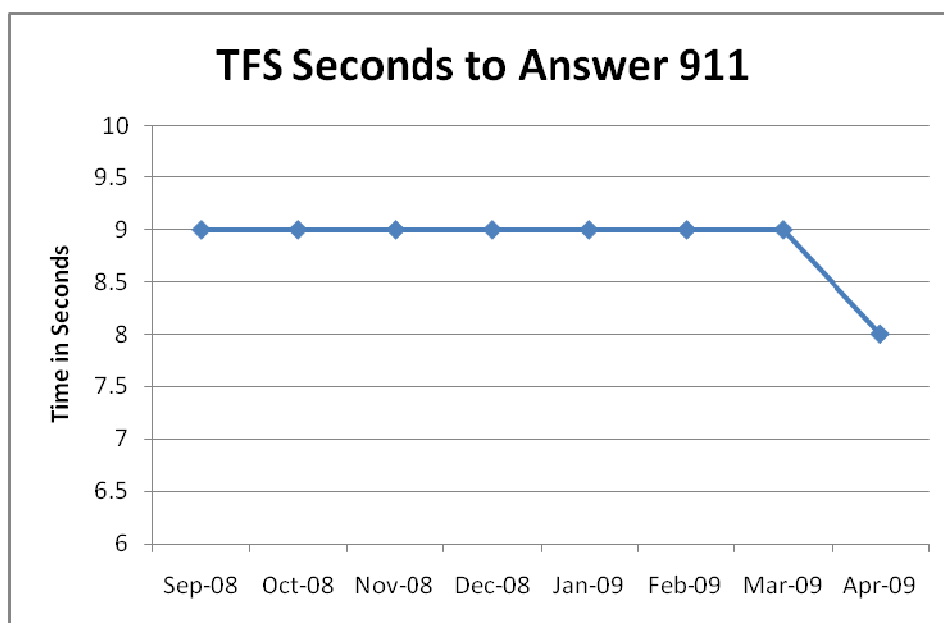


Figure 20: TFS Average Time to Answer 9-1-1

10.4. Analysis

Based on the small number of months for which 9-1-1 data is available, it appears that Toronto Police and Toronto Fire are working effectively to answer the initial call from the public and then transfer that call to Toronto Fire. At this point their success with the PSAP transfer is measured by a 30 second average time however additional work will be required to address the fact that the 95th percentile is nearly double what is proposed by the NFPA standard. It is recommended that the two agencies continue to work to examine this data on a regular basis and address any instances where the emergency calls are not successfully handled.

In a number of provinces⁸³ there are very active 9-1-1 service providers group comprised of the telephone company and the 9-1-1 call centers including the down-stream agencies. They meet regularly and examine this type of data and work with the telephone company to develop new

⁸³ This occurs at least in Alberta and British Columbia, where this cooperative model has existed since at least 2001.

initiatives. For their part the service providers (Police, Fire and EMS) provide feedback and guidance to the telephone companies in terms of service issues.

11. Standards of Cover

The issue of the ways in which fire apparatus are redistributed to cover halls vacated by reason of attending an emergency call or for the purposes of training was discussed with staff during the various site visits. Without response data by area, it was determined that there was a lack of consistency in the way in which this was managed. The 'move up' of apparatus is an important task that is assigned to the two dispatch Captains and it was agreed that a more rational method should be proposed to ensure that the best decision were made.

11.1. Distribution of Incidents by Beats

The basis for the analysis was a review of the call volume by the response areas or 'beats' as shown in the following map. The allocation of the beats was determined at the time the CAD system was configured, and so the alarm data contains the beat number along with all of the other data. This allows for a data query for the call volume by beat to determine the range of activity for each.

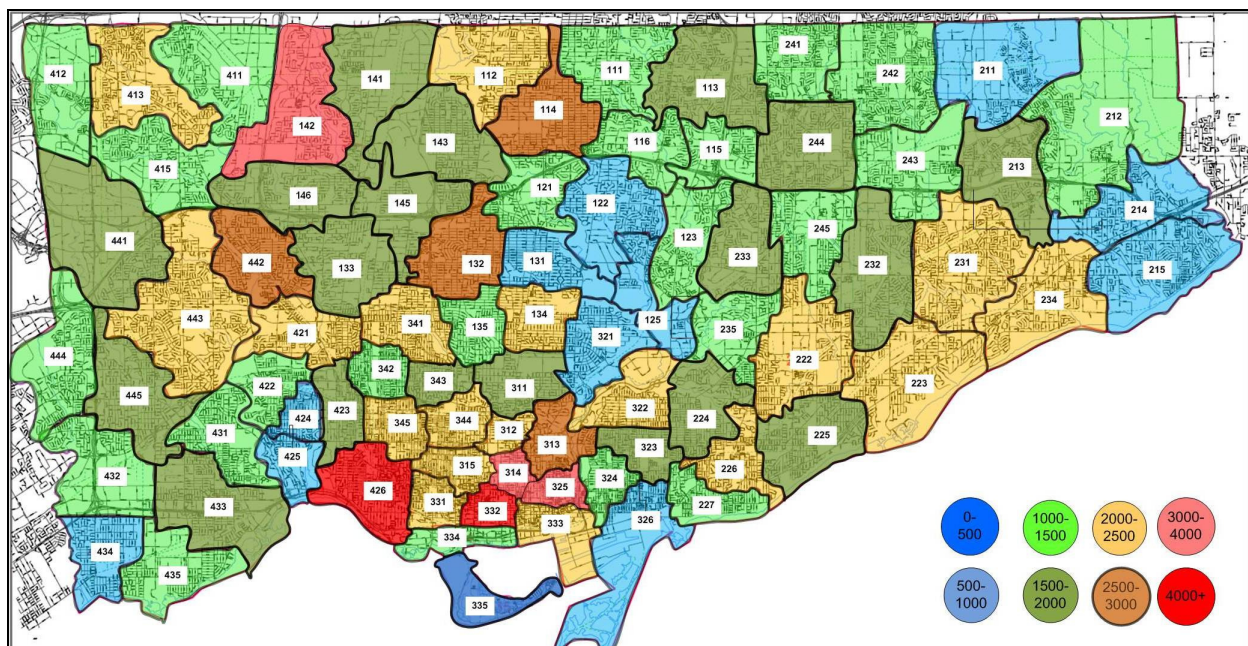


Figure 21: TFS Hall Response Areas with Event Volumes

The result is the hot spot map above which shows the number of incidents per beat for the year 2008. The range of the number of incidents per beat is quite extraordinary with some receiving 8 times as many calls as a neighboring beat.

Put another way this means that those beats shown in red in this map are 8 times more likely to get the next emergency incident and so when redistributing the available apparatus, some thought should be given to prioritizing the coverage for those areas.

It is proposed that the distribution of incidents by beat should become the basis for a written move-up algorithm that can be used to guide the Captains and District Chiefs in managing apparatus. One additional recommendation will be consideration of a software version of a move-up module that 'listens' to the CAD and provides a pop-up prompt to the dispatcher when an area has a deficit of apparatus.

12. Recruitment

12.1. Background

Toronto Fire has worked with the City of Toronto to manage the recruitment process to identify potential dispatchers. Until recently the recruitment was very broadly focused and resulted in a very large numbers of candidates. In turn this required a great many hours of review, testing and interviews.

12.2. Changing Requirements

Candidates for fire dispatching now must now have considerable keyboarding skills given the increasing sophistication and complexity of dispatch equipment along with the more recent focus on very tight call management standards. Recruitment to provide suitable candidates for this changing environment has led Toronto Fire to work more closely with the City's Human Resources Department and the result is new model that appears to be yielding a smaller, more manageable group but one with the desired initial skill set.

12.3. Testing Standards

TFS has continued to evolve the testing methodology to ensure the most suitable candidates are identified. This has included the recent implementation of Criticall[®], a software testing system that is gaining greater acceptance by emergency agencies in Canada including TEMS. In addition, more job specific interviews will be conducted with potential candidates to try and obtain the closest possible match with the current job requirements.

13. Training

The master fire plan from 2007 also identified training as a point of focus for further study.

Staff training is another issue that has been identified with respect to quality assurance in the section. The Communications section has a dedicated Training Captain to provide division specific training to staff. This position should be further developed to ensure the needs of the section are being met. Over the term of this plan, the section should work on developing the following training initiatives:

- 1. Completion of current training project, which is the development of a scenario based training program for Call Taker/Dispatchers*
- 2. Review and improve/update the existing recruit training program in the section*
- 3. Provide opportunities for more formalized in-service training*
- 4. Pursue training programs through the Association of Public Safety Communications Officials (APCO), such as:*
 - a. Basic Telecommunicator*
 - b. Fire Services Call Taker/Dispatcher*
 - c. Training Officer*
 - d. Communications Centre Supervisor*
 - e. Leadership program (currently under development)*
- 5. Promotional Training Programs for District Chiefs and Captains*
- 6. Programs that allow Communications staff to reconnect with the Operations division, including the potential to offer courses from Operations recruit training, and scenarios/exercises with Operations to reinforce procedures.⁸⁴*

Each of these points is well founded, and the need for these was outlined in the work over the past year. In particular, the need for ongoing training of staff was identified as a major way to increase the level of consistency. It was noted in the peer survey that many departments have adopted on-duty training by individuals who provide this training on a consistent basis across all four shifts.

⁸⁴ TFS Master Fire Plan, page 62.

13.1. Initial Training

Initial training had been provided by a Captain and the training syllabus is well established and provides familiarity with all equipment as well as the requisite policies and procedures. When individuals have received their initial training they are evaluated and placed on duty. At this point they are not considered as part of the minimum staffing level and continue their training in the live environment under direct supervision. This period of time is normally 4 weeks, but can be extended as required, followed by a final evaluation.

In the most recent round of recruit training in the 4th Quarter of 2009, and due to the absence of the Training Captain, the training was delivered by two Acting Captains who volunteered to perform these duties. To prepare them for this, they were first provided with qualified instructor certification to ensure that standards would be met. This additional training as a qualified instructor has been well received and other members of the dispatch team have signified their interest in pursuing this.

13.2. Ongoing Training

As noted, the issue of ongoing training in a formal, standard way has been identified as a requirement. To this point, training for personnel assigned to a working shift has been delegated to the shift Captains and to the District Chief, but for reasons related principally to consistency it is recommended that one or more dedicated trainers perform on-duty training for all personnel. This training will be revised based on the requirements identified in this quality assurance review with a focus on completing call taking and dispatch tasks within the expected parameters.

13.3. Promotional Training

The issue of succession planning and promotional training was reviewed with the Division Chief and Training Captain, as well as with the District Chiefs and dispatchers. There is a formal training and promotional process required for the position of District Chief while the other steps are somewhat less formal. Consistent with the discussion at other parts of this report regarding a standard approach to all aspects of call taking, dispatch and management it is proposed that the requirements for each position be reviewed and clarified.

The comments do not imply that persons are promoted without the required competence; rather the recommendations are proposed to ensure complete clarity about what is required for each of the positions with the availability of the formal training material as well as the required coaching and mentorship spelled out.

14. Dispatch Facility

14.1. Primary Site

14.1.1. Layout

The layout of the dispatch consoles at Dufferin Street is shown in the following figure.

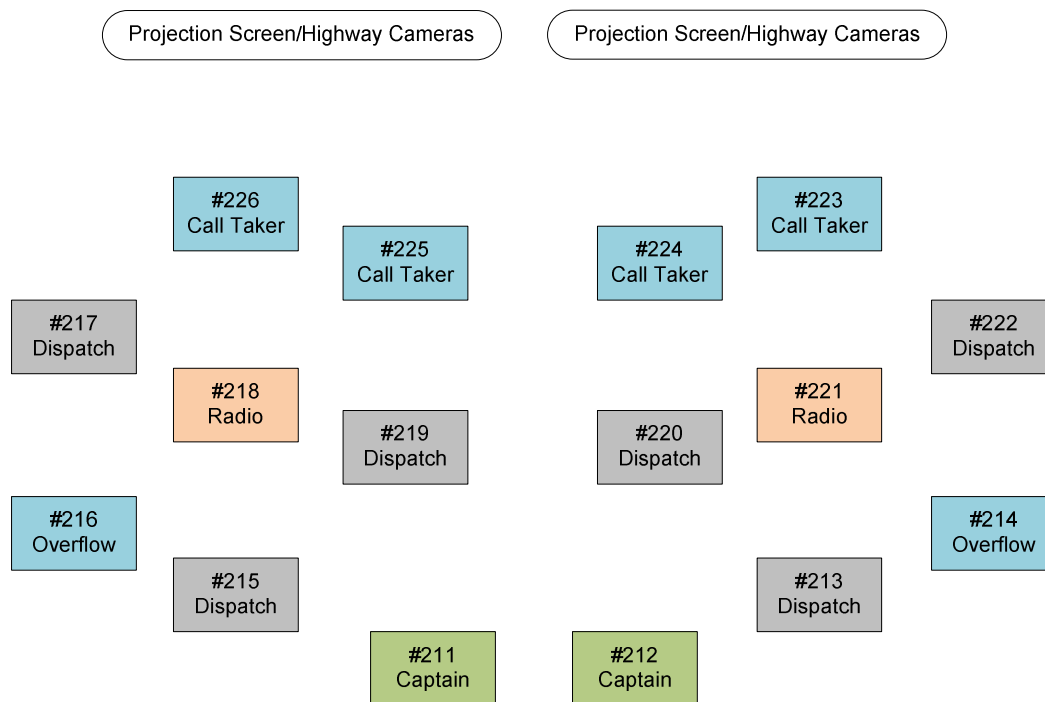


Figure 22: Console Positions, 4330 Dufferin

The particular layout was developed when the dispatch offices were consolidated and for many reasons it works well today. The forward focus of each workstation was predicated in part on everyone having the ability to view the highway camera projection screens.

However the issue of the distribution of workload between the four zones suggests that some realignment based on this should be considered. This would include possibly an additional radio operator for South Command. Some thought should also be given to the layout of consoles found in many other communication centres that has work groups aligned in pods where visual contact is easier than it is in the current TFS layout.

For these reasons it is recommended that TFS review its workflow especially as it may be affected by changes in the CAD system as part of the upgrade, along with a survey of the membership and consider an alteration of the console layout. The objective would be to provide an optimal layout of consoles to enable visual and audible communication and support, at a minimum between the four commands; one that would allow for the best level of oversight by the District Chiefs.

14.2. Backup Site

The backup dispatch office for Toronto Fire Services is located at 703 Don Mills Road in the Toronto Police Services building⁸⁵. The backup site provides almost complete functionality, lacking only a connection to the MDT operation, and the site is tested regularly. It should be stated at the outset that Toronto Fire is to be commended for the ability of their personnel to change locations and operate from their secondary site. A very large number of communication centres lack any type of a backup or secondary site, and for those that have them, they are rarely if ever exercised.

Transfer between sites takes approximately 60 minutes, with 45 minutes for travel of a crew between the two sites, and 15 minutes for setup and configuration of the equipment. When the transition occurs, the 9-1-1 lines are switched to appear at the secondary site and radio and CAD are enabled upon arrival. The Don Mills site also has an ANI/ALI printer to provide 9-1-1 information as required.

The workstations are more crowded and there is much less personal space however the secondary site is essentially fully functional. As part of the review the consultants saw a transition occur between sites and it was effected flawlessly. The coordination between the District Chiefs, the Captains and the I.T. staff was very good. The only recommendation that could be made would be to commit the entire process to writing in a single document, with appropriate check lists including all contact and alternate phone numbers.

⁸⁵ This is also the backup site for Toronto EMS; in turn, 4330 Dufferin is the backup site for Toronto Police and the 911 centre.

14.3. Tertiary Site

Toronto Fire also has a tertiary site that is in Hall 114 on Canterbury Street. This site is functional but lacks most technologies including CAD. Dispatch operation from this site could still be managed but all recording of incidents and any other transactions would be by 'paper and pen'. Lacking CAD, the dispatchers would use paper maps and magnetic boards to track apparatus.

This site has never actually been used however all phones, including 9-1-1 are tested at least once a year just prior to those occasions that the Don Mills site is taken down for routine maintenance or other reasons.

15. Staffing Model

15.1. Operational Staffing

Toronto Fire operates with a minimum of 9 call takers and dispatchers on night shifts and weekend day shifts. During week days they operate with a minimum of 10 but the number may be more than that based on the occurrence of sick leave, vacations, other leave, etc. TFS dispatch also has the ability to provide additional staff as required for known peak periods during the year.

The dispatch floor is directly supervised by a District Chief and two Captains who are accountable for all aspects of the operation during their tour of duty. The organizational chart also includes a Training Captain that works a four day rotation on day shifts only. At the time this report was being prepared, the position was vacant.

The issue of training is dealt with elsewhere in the report and one related recommendation is to have trainers assigned directly to the shifts with the overall responsibility for training across the shifts. The reason for this is that the Training Captain's duties were limited to training new hires or those who were being trained as part of a duty to accommodate and there was little or no capacity for providing training to the members on each shift.

The survey of other dispatch centres that was conducted noted that every other centre did provide on-shift training of call takers and dispatchers, recognizing the extensive amount of material for which they were responsible including operating guidelines, technology and departmental policy. The provision of shift trainers will not remove the requirement for at least one individual to have overall responsibility for training across all four shifts however. The exact rank and job description for that position is still to be determined.

15.2. Shift Pattern

Members of the TFS dispatch work a two platoon system with start times of 0730 hrs and 1730 hrs. In practice the start time is somewhat more flexible and as most organizations do, the guide is 'one in, one out'. This type of shift pattern is quite common, is reasonably well accepted and until the 24 hour tour of duty was adopted in fire suppression, the duty cycle in dispatch and suppression was identical.

15.3. Organizational Structure

The approved organizational structure for TFS Communications and Technology is shown in Figure 23. This model was developed as part of the amalgamation and with the exception of the reduction by one call taker/dispatcher on night shifts is virtually unchanged. As a result of the recommendations contained within this report it is proposed that an on-duty trainer will be assigned to each shift; the strategic planning process with staff also suggested the addition of a third Captain on each shift.

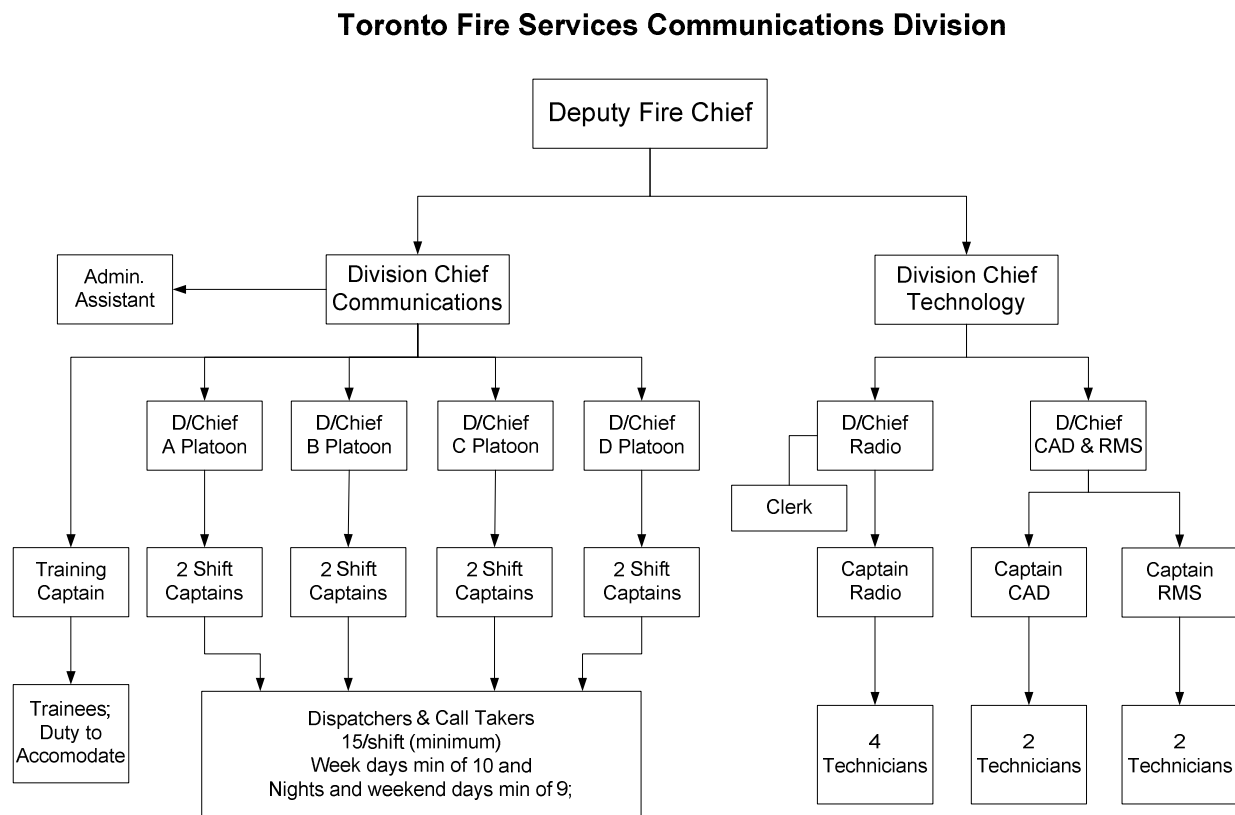


Figure 23: TFS Communications Organizational Chart

16. Peer Survey

16.1. Context for Peer Survey

The use of a peer survey was consistent with the objectives for the Toronto Fire Services quality assurance review. The QA review had a number of defined objectives and these included the definition of an appropriate quality assurance model for the TFS. In a pure sense a QA model could be developed based solely on the standards of service defined by the NFPA but one goal was also to understand what the best practices of other agencies were. It was suspected that these might either include QA measures based on different external standards, or perhaps be based purely on local requirements.

16.2. Objectives

The survey had a number of objectives related to determining what best practices might be for staffing, supervision, operating policy, adherence to standards, business continuity, etc. The complete survey which contains over 300 questions is shown in the Appendix and includes major headings as follows:

1. General Background
 - a. Name of the organization
 - b. Population day and night
 - c. Call volume
 - d. Communications issues raised by an Underwriters' study
2. Dispatch Centre
 - a. Owned by the fire department, or contracted from another agency
 - b. Description of all positions working within the centre, union and exempt
 - c. Rates of pay
 - d. Minimum and regular staffing
3. Standards of Service
 - a. Call taking
 - b. Dispatch
 - c. 9-1-1 call handling
 - d. Results of measurement

4. Quality Assurance Management
 - a. Whether the agency utilized a QA system
 - b. Methods by which it is tracked
5. Customer Service Measurement
 - a. Are residents or clients surveyed to determine their satisfaction with the service
 - b. Details of how this is gathered and collated
6. Operating Model
 - a. Length of shifts/shift pattern
 - b. Assigned positions or ad hoc
 - c. Provision of other services such as alarm monitoring
 - d. Standards of cover
 - e. Post incident reviews
7. Dispatch Policy
 - a. Horizontal vs. vertical model
 - b. Present of standard operating guidelines (SOG's)
 - c. Compliance with SOG's
8. EMS
 - a. Degree to which the fire department response includes EMS including ALS
 - b. Interface with EMS dispatch CAD if different from fire department
9. Staffing Model
 - a. Day and night minimum and maximums
 - b. Average years of service
 - c. Relief dispatchers
 - d. Presence of EAP, attendance management and CISD programs
10. Recruitment
 - a. Qualifications (minimum and preferred)
 - b. Grounds for disqualification
 - c. Testing of recruits including threshold scores, software testing systems
 - d. Requirement for a medical
 - e. Interview process
 - f. Retention rate
 - g. Lateral transfer policy

- h. Requirement for a security clearance
- 11. Personnel Assessments
 - a. Who they are done for
 - b. Who conducts them
 - c. Frequency of assessments
- 12. Training and Promotion
 - a. Call taker
 - b. Dispatcher
 - c. Radio Operator
 - d. Shift Supervisor
 - e. Division Supervisor
 - f. Trainers
 - g. Presence of external and/or internal training
 - h. In-service training
 - i. Promotional policy; basis for this
- 13. Supervisory Model
 - a. Supervisory levels, and the number of personnel each level manages
 - b. Breakdown of the workload of the supervisors
- 14. Communication Centre Layout
 - a. Types of workstations
 - b. Average area per dispatcher
 - c. Lighting
 - d. Locker space
 - e. Exercise equipment
 - f. Kitchen, lounge area
- 15. Other Equipment
 - a. Headsets
 - b. Mapping
 - c. Status boards
- 16. CAD System
 - a. Vendor, version
 - b. Collateral technology such as rip & run sheets, mobile workstations

- c. Type of station alerting systems
- 17. System Status Management
 - a. Use (or not) of deployment management systems
- 18. Call Logging, Voice Recording
 - a. Vendor and version
 - b. Retention periods
- 19. RMS System
 - a. Vendor and version
 - b. Interface with CAD
- 20. Support Personnel
 - a. Definition of the support structure for the communications system by IT, CAD, Wireless, HR, etc
- 21. Business Continuity
 - a. Presence of a backup centre
 - b. Type of centre—Cold, Warm or Hot
 - c. Degree of redundancy

16.3. Cities Surveyed

The cities surveyed included 6 in Canada and 13 in the United States as follows:

- **Canada:** Toronto⁸⁶, Vancouver, Winnipeg, Edmonton, Calgary, London
- **United States:** Philadelphia, Dallas, Baltimore, Atlanta, Houston, Indianapolis, San Diego, Pittsburgh, Boston, Denver, Cleveland, Cincinnati, Phoenix

The survey was developed in an electronic format, and was forwarded to each of the departments with a cover letter from the Toronto Fire Chief requesting their cooperation in completing and returning the survey. It is hoped that this will provide some guidance to one or more organizations and a complete summary of the survey will be provided to each of the respondents.

⁸⁶ Toronto completed the survey to provide a base-line for the comparison with the other departments.

16.4. Results

The results of the peer survey were somewhat mixed in terms of their usefulness. One goal of the survey was to understand QA and other communications issues from true peers, that is departments comparable to Toronto Fire. That unfortunately was not the case as the following graph shows.

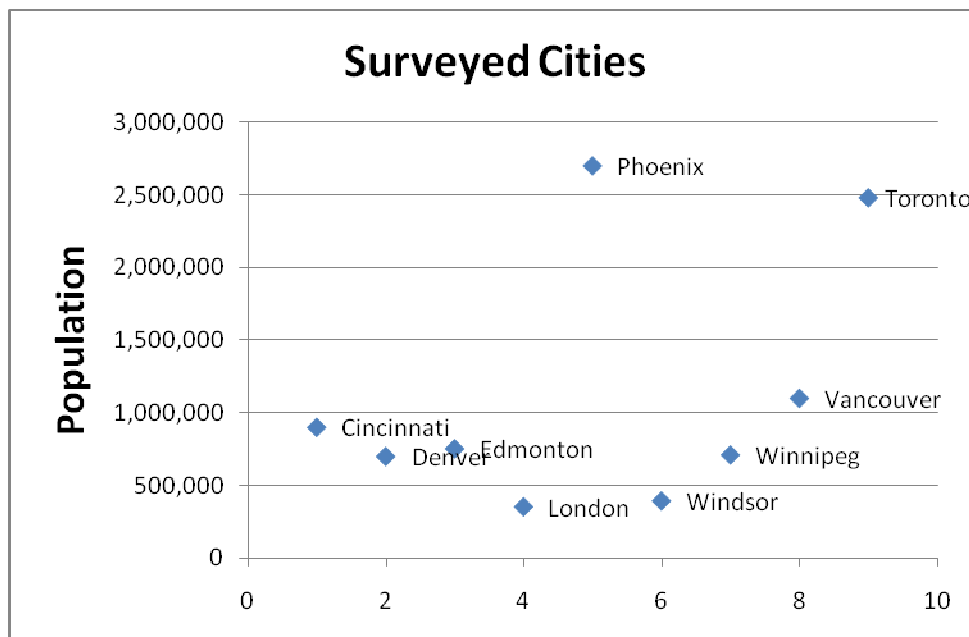


Figure 24: Surveyed Cities by Call Volume

Phoenix was the only comparable department that responded to the survey, however Vancouver was also considered to be reasonably similar in terms of being a metro fire department, and their results were included.

The survey on balance was very useful for the large amount of data that was collected as most departments provided full details about the 300+ questions. The data regarding written standards of service and quality assurance is summarized in the following table:

City	Written Standards for Dispatch Processes ⁸⁷			Quality Assurance Program	Vendor ⁸⁸
	9-1-1	Call Taking	Dispatch		
Cincinnati	No	Yes	Yes	Yes	Priority Dispatch
Denver	Yes	Yes	Yes	No	N/A
Edmonton	No	Yes	Yes	Yes	AQUA
London	Yes	Yes	Yes	Yes	In-house
Phoenix	Yes	Yes	Yes	Yes	In-house
Windsor	Yes	Yes	Yes	Yes	Crisys
Winnipeg	Yes	Yes	Yes	Yes	In-house
Vancouver	Yes	Yes	Yes	Yes	In-house
Toronto	No	No	No	No	N/A

Table 6: Peer Survey--Standards of Service and QA

This information shows that Toronto is the only surveyed city in Canada without a QA program and the only city of all those surveyed without defined standards for fire call taking and dispatch.

The survey also included information on call volume and minimum staffing and this is useful to understand the degree to which the staff is occupied with activities during their work cycle. In this case it was only useful to compare the largest centers and the following table shows the total annual calls divided by the minimum on duty strength to yield a statistic for incidents per staff.

City	Annual Calls	Minimum Staff	Calls/Staff
Phoenix	285,411	13	21,955
Vancouver	90,000	5	18,000

⁸⁷ The requirement for written instructions for dispatch processes is a requirement of the NFPA 1221; in particular see section 3.3.71 regarding standard operating procedures.

⁸⁸ Vendor for the QA program.

City	Annual Calls	Minimum Staff	Calls/Staff
Toronto	142,515	10	14,252

Table 7: Peer Survey--Call Volume and Staffing

The recommendations here and elsewhere are based on what are seen as the need for consistency and continuity of training. In particular these focus on the need for increased in-service training. The following table shows that all departments employ in-service training. Toronto manages in-service training through the shift supervisors, not through dedicated trainers or shift trainers.

City	Dedicated Trainers ⁸⁹	Shift Trainers	In-service Training
Cincinnati	Yes	Yes	Yes
Denver	No	No	Yes
Edmonton	Yes	Yes	Yes
London	No	Yes	Yes
Phoenix	No	No	Yes
Windsor	No	No	Yes
Winnipeg	Yes	Yes	Yes
Vancouver	Yes	Yes	Yes
Toronto	Yes	No	Yes

Table 8: Peer Survey--Training Issues

The amount of information obtained in the peer survey is considerable and it is hoped that the survey information will continue to be received and analyzed following the completion of this report. In particular, information from more cities of comparable size to Toronto would provide a greater degree of precision and predictability.

⁸⁹ For in-service training.

17. Summary

The Quality Assurance project with Toronto Fire Services began on a very positive note in July 2008 with a full review of the project scope and a discussion of the standards that would apply. This was followed by site visits in August and November 2008 as well as January, April and June 2009.

During each of the site visits the consultants had unfettered access to speak with anyone connected with TFS communications and without exception these discussions were honest and helpful. At no time did staff display anything other than professional, courteous behavior.

Individual interviews were conducted with the Division Chief, each District Chief, the majority if not all Operational Captains, the Training Captain and a majority of the staff. The dispatch operation was observed in its primary and secondary locations as well, the transfer process to return it to Dufferin Street was also observed. At all times, the operation appeared to be well managed and in control of the situation. In addition the consultants met with Platoon Chiefs and Division Chiefs to gather feedback on how well the dispatch system operated as well as with the leadership and members of the I.T. section who provided valuable advice and a great deal of data.

The consultants participated with the communications liaison committee which deals with issues between fire suppression and dispatch and facilitated a two-day strategic planning session on the future of the TFS dispatch. The latter activity was very positive and yielded a recognition that standards of service should apply to this operation to ensure the best level of service to the public and to the fire fighters. The strategic plan also identified a number of new initiatives that are being considered for implementation.

The dispatch personnel are clear that their mission is to expedite the call management process; however until recently the applicable standard (NFPA 1221) had not been formally recognized. The standard of service and its imperative for speed and accuracy should provide the basis for an informed training, mentoring and management of the staff from this point. As part of this, a quality assurance program is recommended to review the relative success of the organization in handling emergency calls.

One result of the quality assurance process will be a focus on the time-critical nature of call taking and dispatch and this should lead to a review of the defined processes and operational guidelines that support them. A large range of such actions was identified with staff during the site visits and included in these is a reconsideration of the format for the call taking and dispatch screens in the CAD system.

The dispatch CAD system was configured for these purposes as part of the dispatch transition nearly 10 years ago and the workflow within this system has not been re-examined to achieve a better degree of efficiency. As part of the review it is the opinion of the consultants that the workflow inhibits the quick and efficient handling of calls and a considerable amount of improvement can be achieved as part of the approved CAD system upgrade.

TFS will shortly be commencing a transition from their current version of CAD to version 9.0 or higher in 2010. This version of Intergraph CAD will allow for a great deal of in-house configuration of the workflow to significantly reduce the time taken to create and dispatch emergency calls. The consultants worked with staff during the April visit to develop a draft user requirements document for CAD that will provide a basis for this upgrade.

18. Recommendations

The recommendations for Toronto Fire Services range from the adoption of standards and implementation of a quality assurance process to ensure the standards are met. The recommendations also deal the human side of the organization and propose changes in training and the way it is delivered to meet the needs of call takers and dispatchers who provide service to the public.

The recommendations also include various technologies, most particularly the CAD system that can be made much more user friendly in terms of speeding up the workflow and call creation. An additional recommendation was the procurement of the CAD vendor's Business Intelligence software which will provide additional levels of surety around the ability to perform in an optimal way on a moment-by-moment basis.

The review of 9-1-1 call management has only just begun with the commencement of the QA review and Toronto Fire and Police are to be commended for acting swiftly to obtain call management data for review. This continuous review can only improve the process as has been shown in many other jurisdictions and it is recommended that Toronto Fire and Police consider forming a 9-1-1 user's group in Ontario similar to those created in British Columbia, Alberta and other areas.

1. Quality Assurance

- a. Adopt a Quality Standard, NFPA 1221 for all call taking and dispatch functions
- b. Implement a Quality Assurance program to also manage professional standards
 - i. The quality assurance process would include:
 1. Statistical review to measure performance compared to the NFPA 1221 standard
 2. Call review to measure compliance with time standards, policies and procedures
 3. Post incident reviews for major events and multiple alarms from a communication centre perspective
 4. The QA review should also consider examining the various workflows within the centre such as InterCAD with TEMS; 9-1-1 from the public, etc.

- c. Create a Quality Assurance/Professional Standards Section
 - i. The rank of this individual in charge of the section should be considered as a District Chief at a minimum
 - d. Report the results of the Quality Assurance program to TFS Senior Management
- 2. Protection of Privacy
 - a. Develop an overall plan for management and security of all data utilized by TFS, including, but not limited to data on rip & run sheets, etc.
 - b. Develop clear policies with regard to the type and amounts of data approved for entry in CAD via DBM, etc. as well as a retention and purge schedule
- 3. Strategic Plan
 - a. Confirm and implement the results of the initial strategic plan that was conducted in 2009
 - b. Review the strategic plan on a regular basis and revise accordingly
- 4. Operations
 - a. Implement a standard operating model for all phases of call taking and dispatch that is consistent for all four shifts
 - b. Develop a formal process to allow operations staff and trainers to meet regularly to define, implement and then revise the operational and training models
 - c. Consider supplementing the staffing for south command, based on the increased level of work
 - d. Consider implementing a third Captain for Operations at a minimum on day shift to assist with/support a standard operating model
 - e. Develop a formal process for documentation management to move as much as possible to HTML format and with availability at all workstations and to be managed from a single point
- 5. Training
 - a. Implement a Training Captain with responsibility for training on-shift members to ensure a standard operational model
 - b. Amend the training model for new hires to train first as call takers and when they have demonstrated competency to offer a second round of training as a dispatcher, prior to doing this work

- c. Implement a training program for succession planning from call taker to dispatcher, from dispatcher to Captain and from Captain to District Chief
 - d. Develop a familiarization program for the Platoon Chiefs for the times when they respond to dispatch during emergencies of all kinds
 - e. Purchase a dispatch simulator to use for initial training as well as in-service training to ensure consistent operations and to manage changes in the technology
 - f. Consider and develop a plan for a communications centre equivalent to Don Mills but within a shorter travel time that would have the additional purpose of being a dedicated training facility
 - g. Provide general software training for supervisory staff to allow them a greater efficiency with spreadsheets, presentations and documents
 - h. Ensure that dispatch training and operations training are fully congruent as regards terminology and procedures for IMS, Mayday, etc
6. 9-1-1
- a. Continue to receive 9-1-1 statistical reports from Bell and work with Toronto Police Services to optimize these
 - b. Report the 9-1-1 call management statistics to the Communications Division and to the Fire Chief
 - c. Implement a Provincial 9-1-1 user's group
 - d. Continue to evaluate the 9-1-1 protocol to consider any additional call types or situations that could be forwarded directly to TFS
7. Dispatch Centre
- a. Conduct a workflow analysis that covers each of the scenarios for the call management process
 - b. Re-evaluate the configuration of the call taking, dispatch and supervisor consoles based on the workflow analysis
 - c. Provide a suitable workspace for the Platoon Chief or other senior officer responding to dispatch during multiple alarms to provide technology as required
8. Technology CAD

- a. Conduct a workflow analysis related to all aspects of call taking, dispatch and management to form a basis for confirming the requirements from CAD for the upgrade
- b. Investigate and implement a telephony interface to CAD that will capture all call answer times
- c. Continue the implementation of the current upgrade but have it based on the QA review and the requirements to change workflow to improve speed and accuracy
 - i. Ensure that as part of the CAD upgrade that all changes and modifications are properly described, appropriate procedures are developed and communicated to staff in advance
 - ii. Revise the workflow to shorten the call taking and dispatch process and to allow for simultaneous updates
 - iii. As part of the upgrade consider ways in which the paramedic vehicle # could be added by field personnel and transferred as required to the RMS
 - iv. Also develop a method by which the TEMS incident number can be transferred to the incident report in the RMS
- d. Augment the use of mobile workstation technology by fire crews to allow for incident messaging and 'pull' capability for building and other safety information
- e. Consider the procurement of the Intergraph Business Intelligence software
- f. Implement mobile workstation technology for Platoon Chiefs
- g. Provide enhanced capability at dispatch workstations to include HTML documents related to Operational Guidelines and all other relevant training and operational material
- h. Continue to work with TEMS to provide the best possible interface to receive and send information between the two CAD systems to include
 - i. Resolution of the challenges with receiving accurate location information for highway calls.
 - ii. Ways in which dangerous or scene-safety issues can be passed to TFS and flagged to attract the dispatcher's attention
 - iii. Re-evaluation of the MPDS determinants and TFS event types
- i. Work with TEMS to provide an interface to send calls which originate with fire, to create standby or response events for TEMS.

- j. Implement a more robust backup strategy to allow for a seamless failover and failback to and from Dufferin to Don Mills
 - k. Consider a replacement fire hall alerting system with an IP-based system to improve the speed of transmission
 - l. Consider moving to a GPS-based recommendation for dispatch; this would include an evaluation of the accuracy of the GPS location information in areas with greater building density as well as the update rates from GPS to CAD
 - m. Consider ways in which the apparatus attributes and equipment can be viewed more easily by crews in the fire halls, possibly by Net-Viewer to enable more timely and complete entries
9. Technology RMS
- a. Implement a complete, integrated RMS package that meets all Ontario standards for reporting
 - b. Implement a robust up-link interface to the CAD to provide critical information to dispatchers and to responding fire crews to aid decision making and ensure safety
10. Technology Radio
- a. Ensure that the scheduled radio upgrade includes a full digital interface with CAD to provide for the linking of portable and mobile radios ID's to CAD

19. Appendix 1: Terms and Phrases

- APCO: Association of Public-safety Communications Officials
- CAD: Computer Aided Dispatch
- EMD: Emergency Medical Dispatch
- NAED: National Academies of Emergency Dispatch
- NENA: National Emergency Number Association
- NFPA: National Fire Protection Association
- PSAP: Public Safety Answering Point
- PSTN: Public Switched Telephone Network
- RMS: Record Management System
- SOG's: Standard Operational Guidelines
- SRCS: Subway Radio Control System
- TEMS: Toronto Emergency Medical Services
- TFS: Toronto Fire Services

20. Appendix 2: 9-1-1 Call Data

1. PSAP answering times
 - a. Time call offered
 - b. Time call answered
 - c. Average waiting time
 - d. Maximum waiting time
 - e. Average total time
 - f. Maximum total time
 - g. Average time in RAN
 - h. Calls dropped
 - i. By the day of the week
 - ii. By the month
 - iii. By the half hour
 - i. Calls completed
 - i. By the day of the week
 - ii. By the month
 - iii. By the half hour
2. PSAP average time to complete
 - a. Down-stream to Fire
 - b. By the day of the week
 - c. By the month
 - d. By the half hour
 - e. Calls dropped
 - f. Calls completed
 - g. Average wait time to answer
 - h. Maximum wait time to answer
 - i. The above based on
 - i. By the day of the week
 - ii. By the month
 - iii. By the half hour
3. TFS average time to answer
 - a. Time call offered
 - b. Time call answered
 - c. Average waiting time
 - d. Maximum waiting time
 - e. Average total time
 - f. Maximum total time
 - g. Calls dropped
 - h. Calls completed
 - i. By the day of the week
 - ii. By the month
 - iii. By the half hour

21. Appendix 3: Survey Form



Toronto Fire Services Quality Assurance Program Benchmarking Survey

Instructions: TAB or move your mouse to the next highlighted section and complete your response.

1. General Background Information

- a. Name of the jurisdiction
- b. Details of the person completing the survey
 - i. Name
 - ii. Position
 - iii. Phone #
 - iv. Email address
- c. Do you or your organization belong to any of the following (please check all that apply)?
 - i. APCO ☐
 - ii. NENA ☐
 - iii. NFPA ☐
 - iv. Other
- d. Jurisdiction Population
 - i. Day
 - ii. Night
- e. Is your entire jurisdiction dispatched from one location? Yes ☐ No ☐
 - i. If not, how many?
- f. Yearly Call Volume
 - i. Total calls handled
 - ii. Percentage of medical calls
 - iii. Number of motor vehicle accident responses
 - iv. Number of fire calls
 - v. Number of multiple alarms

- g. Has your jurisdiction had an Underwriter's/IAO Survey within the last 5 years?
- i. What year
 - ii. Were there specific dispatch recommendations? Yes ☐ No ☐
 - (1) If yes, what were they?
- h. Does your jurisdiction have a defined emergency operations centre (EOC)?
Yes ☐ No ☐
- i. If yes, is this for the Department only (DEOC)? ☐
 - ii. Or is this for the entire jurisdiction? ☐
 - (1) If so, does the fire department participation with the EOC include communication capability? Yes ☐ No ☐
 - (a) If yes, please specify
 - iii. Do you employ Incident Management System (IMS) software? Yes ☐ No ☐
 - (1) If yes, please specify vendor

2. Dispatch Centre Background

- a. Who is the employer of the dispatch center staff?
- i. Your Fire Department? Yes ☐ No ☐
 - ii. Another (contract) Fire Department? Yes ☐ No ☐
 - (1) Name of the department
 - iii. Other City Division? Yes ☐ No ☐
 - (1) Name of the Division
 - iv. Other? Yes ☐ No ☐
 - (1) Describe
- b. Is the staff unionized? Yes ☐ No ☐
- i. If yes
 - (1) Union certification
 - (2) Local #
- c. Which positions are exempt (Number and rank of positions)?
- d. Provide the full organizational chart with reporting lines for all positions. ☐
- e. Please provide position descriptions for all positions in the Center. ☐
- f. Please provide the rates of pay for all positions in the Centre. ☐
- g. Call Taker/Dispatcher Positions
- i. Number of positions (Complement versus Minimum Staffing)
 - ii. Are call taking and dispatch combined? Yes ☐ No ☐

- iii. Or separate functions? Yes ☐ No ☐

3. Standards of Service: What standards of service apply to the following dispatch activities?

a. Call Taking

- i. Do you have a standard that defines how much time your call takers have to answer the phone, interrogate the caller and create a dispatchable event in your CAD system? Yes ☐ No ☐
- (1) ☐ If yes, is this an external standard (e.g. NFPA 1221)? Yes ☐ No ☐
- (a) If yes, what is the standard used (including year if appropriate)?
- (b) If no,
- (i) What is the amount of time that your organization has prescribed for this task?
- (ii) What is this standard based on?
- ii. Any additional comments on Call Taking Standards?

b. Dispatch

- i. Do you have a standard that defines how much time your dispatchers have to review the created call in the CAD system and to complete the toning of the crews and reading the information to them? Yes ☐ No ☐
- (1) ☐ If yes, is this an external standard (e.g. NFPA 1221)? Yes ☐ No ☐
- (a) If yes, what is the standard used (including year if appropriate)?
- (b) If no,
- (i) What is the amount of time that your organization has prescribed for this task?
- (ii) What is this standard based on?
- ii. Any additional comments on Dispatch Standards?

c. 9-1-1

- i. If your jurisdiction has a 9-1-1 system, does it have a standard of service for this activity? Yes ☐ No ☐
- ii. If yes, is this the time to answer (pick up) the call? Yes ☐ No ☐
- (1) If so, what is the number of seconds, or number of rings?
- (2) What is this interval/number of seconds based on?
- iii. Or, is this the time to down-stream the call from the PSAP to the agency?

- d. Do you measure to see how well you achieve the standards for 9-1-1, call taking and dispatch? Yes ☐ No ☐
- i. If yes, what is your success rate?
- (1) For 9-1-1, as a percentage of all calls
- (2) For call taking, as a percentage of all calls
- (3) For dispatch, as a percentage of all calls
- ii. Is the analysis calculated by an automated system? Yes ☐ No ☐
- iii. Or, does the analysis get done by direct observation? Yes ☐ No ☐
- e. Information requests regarding call taking and dispatch
- i. What is your turnaround time for information requests?
- ii. Do you prioritize these by importance? Yes ☐ No ☐
- iii. Are you guided by a freedom of information & protection of privacy (FOI POP) Policy? Yes ☐ No ☐
- (1) If yes, is this legislated?
- iv. Do you have a policy to release written or audio transcripts? Yes ☐ No ☐
- (1) If yes, is this an internal policy? ☐
- (2) Or, is this an external policy? ☐
- iv. Do you have a policy for the retention of recorded information? Yes ☐ No ☐
- (1) If yes, what is the retention policy?
- v. Who produces the transcripts?

4. Quality Assurance

- a. Do you have a quality assurance program for fire dispatch? Yes ☐ No ☐
- b. Is it software based? Yes ☐ No ☐
- i. If yes, what software do you use?
- ii. If not, how is it defined?

5. Customer Service

- a. Do you survey the residents of your jurisdiction to determine their level of satisfaction with your dispatch operation? Yes ☐ No ☐
- b. If yes, how is this conducted?
- i. By phone call as part of an overall survey? ☐
- ii. By comment card? ☐
- iii. Other (please specify)?

6. Operating Model

- a. Shift duration: What is the duration of the shift(s)?
- i. 8 hours ☐ 10 hours ☐ 12 hours ☐ 14 hours ☐ 24 hours ☐
Other (describe)
- b. Shift pattern
- i. Is there a regular shift pattern? Yes ☐ No ☐
(1) If yes, please describe it?
- c. What is the average number of hours worked per week?
- d. What is the policy for breaks during a shift?
- e. How is shift change performed?
- i. Person for person? Yes ☐ No ☐
ii. By position? Yes ☐ No ☐
iii. By lineup? Yes ☐ No ☐
- f. What is the time line (if any) for the completion of the shift change?
- g. Does the shift change include an inspection of the oncoming personnel?
Yes ☐ No ☐
i. If yes, what is the policy for this?
- h. Do personnel have assigned positions? Yes ☐ No ☐
i. If yes, how are these assigned?
- i. Is there a leave policy—with or without pay—for education or other reasons?
Yes ☐ No ☐
i. If yes, for what reasons; also please describe the amount of leave granted?
- j. Does your center provide alarm monitoring? Yes ☐ No ☐
i. If yes, is it for?
(1) Fire? ☐
(2) Intrusion? ☐
(3) Is it certified? (UL/ULC) ☐
- k. Do you provide dispatch for other services?
- i. Other fire departments Yes ☐ No ☐
ii. EMS Yes ☐ No ☐
iii. Public works? Yes ☐ No ☐
iv. Others (describe)

I. Standards of Cover:

i. How many units do you dispatch per event type?

- (1) Structure Fire
 - (a) Second alarm
 - (b) Third alarm
- (2) Motor Vehicle Accident
- (3) Hazmat incident
- (4) Others

ii. Which are 'routine' (non emergency)?

m. Does your department conduct post incident reviews (PIRS)? Yes ☐ No ☐

i. If yes, is there dispatch participation? Yes ☐ No ☐

ii. How is this achieved?

iii. Is the PIR specific to communications issues or does it cover all aspects of the response by the department?

- (1) Communication only? Yes ☐ No ☐
- (2) All response aspects? Yes ☐ No ☐

7. Dispatch Policy

a. Does your center utilize a horizontal call model (separate call takers and dispatchers)?

Yes ☐ No ☐

b. Does your center utilize a vertical model (the same person takes the call and dispatches it)? Yes ☐ No ☐

c. Are communications procedures identified in standard operating guidelines (SOG's)? Yes ☐ No ☐

d. Are there other policy documents in addition to SOG's? Yes ☐ No ☐

i. If yes, how do these differ from the SOG's?

e. Compliance with SOG's: how is this managed?

8. EMS

a. Does your department provide first responder with an EMS provider? Yes ☐ No ☐

b. Do you provide Advanced Life Support (ALS)? Yes ☐ No ☐

c. Is there a link from the EMS CAD to the Fire CAD? Yes ☐ No ☐

i. If yes, does it send:

- (1) Pre-alert? ☐

(2) Final determinant? ☐

9. Staffing: What is your staffing model?

- a. Per day shift
 - i. Minimum and
 - ii. Maximum
- b. Per night shift
 - i. Minimum and
 - ii. Maximum
- c. Is it variable by time of the day? Yes ☐ No ☐
 - i. If yes, on what basis?
- d. Is it variable by special event? Yes ☐ No ☐
 - i. If yes, what is the level and how is that determined?
- e. What are the average years of service?
- f. Does your jurisdiction utilize?
 - i. Full time dispatchers ☐, or
 - ii. Are staff provided on rotation from fire hall ☐
- g. Where are relief dispatchers drawn from:
 - i. From dispatch pool of staff? ☐
 - ii. From fire hall? ☐
 - iii. Other?
- h. Do you have an overtime callback policy for communications? Yes ☐
No ☐
- i. Does your center utilize a critical incident stress debriefing (CISD) program?
Yes ☐ No ☐
- j. Does your center utilize an employee assistance program (EAP)? Yes ☐ No ☐
- k. Does your center utilize an attendance management program? Yes ☐ No ☐
- l. How do you distribute new information and verify its receipt?
 - i. Individual Email ☐ Receipt verification (explain)
 - ii. Training Records ☐ Receipt verification (explain)
 - iii. Other (describe) Receipt verification (explain)

10. Recruitment: How is your recruitment for dispatch center staff conducted?

- a. Qualifying requirements
 - i. Education
 - ii. Other skills such as keyboarding
 - iii. Pre-requirements
- b. Is the recruitment process conducted by
 - i. Fire department staff ☐, or
 - ii. Other
- c. Are there any grounds for disqualification?
 - i. Color blindness ☐
 - ii. Criminal record ☐
 - iii. Other (describe)
- d. Testing of recruits
 - i. Who participates?
 - ii. Is there a defined test?
 - (1) Software (Criticalll or others)
 - (2) Other (describe)
 - iii. Are there minimum scores? Yes ☐ No ☐
 - (1) If yes, what are they?
 - iv. If there are phases to the testing process, please specify
 - (1)
 - (2)
 - (3)
 - v. Is a Medical required? Yes ☐ No ☐
 - (1) If yes, what is allowed to be requested?
 - (2) What is not allowed to be requested?
- e. Candidate Interview
 - i. Do you have a defined set of questions? Yes ☐ No ☐
 - (1) If yes, would you be prepared to share them with us? Yes ☐ No ☐
 - (a) If yes, please attach, or send separately ☐
 - ii. Do you employ particular interview techniques? Yes ☐ No ☐
 - (1) If yes, what are they?
- f. For the staff that you recruit, what is your retention rate?
 - i. Over one year? ☐

- ii. Over three years? ☐
- iii. Over five years? ☐
- g. Is there a security clearance required? Yes ☐ No ☐
 - i. If yes, what is the clearance level that is required?
- h. Is there a lateral transfer policy in your collective agreement? Yes ☐
No ☐

11. Personnel Assessments

- a. Are they done? Yes ☐ No ☐
- b. Is there one assessment document for all employees? Yes ☐ No ☐
 - i. If not, how does that vary?
- c. Which positions are assessed?
- d. What is the interval?
- e. How are areas identified as requiring development addressed?
- f. Do staff receive training/instruction prior to performing evaluations? Yes ☐
No ☐
- g. Who provides the training?

12. Training and Promotion within the Division

- a. Call taker
 - i. Training period
 - ii. Probation period
- b. Dispatcher
 - i. Training period
 - ii. Probation period
- c. Tactical Radio Operation
 - i. Training period
 - ii. Probation period
- d. Shift Supervisor
 - i. Training period
 - ii. Probation period
- e. Division Supervisor
 - i. Training period
 - ii. Probation period

- f. Are there other positions for which you provide training?
- g. Trainers:
- i. Do you use dedicated trainers? Yes ☐
No ☐
 - ii. Do you have designated Shift Training Instructors? Yes ☐ No ☐
 - iii. Do you identify trainers on an ad hoc/random basis? Yes ☐ No ☐
- h. Do you utilize an in-service training model? Yes ☐ No ☐
- i. Do you utilize external training? Yes ☐
No ☐
- i. Is there a policy for approving external training? Yes ☐ No ☐
 - (1) If yes, what is the policy
 - ii. Do you repay tuition for external training? Yes ☐ No ☐
- j. Is there a written promotional policy? Yes ☐ No ☐
- i. Is this for each position in the center? Yes ☐ No ☐
 - ii. Is there a minimum criteria? Yes ☐ No ☐
 - (1) If yes, what is it?
 - iii. Is promotion based on?
 - (1) Seniority Only Yes ☐ No ☐
 - (2) Merit Only Yes ☐ No ☐
 - (3) Combination Yes ☐ No ☐
 - iv. Is there a pool of qualified acting ranks? Yes ☐ No ☐
 - (1) If yes, please describe it

13. Supervisory Model: This section covers the span of control for the following:

- a. Supervisors (Captains)
 - i. How many personnel do they supervise?
- b. Managers (District Chiefs)
 - i. How many personnel do they supervise?
- c. Division Chief
 - i. How many personnel do they supervise?
- d. What approximate percentage of the daily work of supervisors is done?
 - i. Referencing memos, faxes, paper documents
 - ii. Computer / email
 - iii. White board

- e. How is change identified or requested?
- i. Is there a regular process to review change requests? Yes ☐ No ☐

14. Communication Center Layout

- a. Please provide a diagram, identifying workstations and technology (CAD, Telephones, Radio consoles, recorders, etc). ☐
- b. Square footage (approximate) for
- i. Call takers
- ii. Dispatchers
- iii. Supervisors
- c. What type of work stations do you use?
- i. Brand
- ii. Sit to stand? Yes ☐ No ☐
- d. Number of CRT or LCD screens at each workstation, and the use for each?
- e. What types of lighting are provided?
- i. For the entire center
- (1) Who controls this?
- (2) Are there guidelines for this?
- (3) Is there a standard for minimum lighting? Yes ☐ No ☐
- (a) If yes, please describe.
- ii. For the individual workstations?
- f. Are there separate areas for men and women (locker rooms, dorms)? Yes ☐ No ☐
- g. Is there access to exercise equipment? Yes ☐ No ☐
- i. If yes, is there a policy for its use during a shift?
- h. Who performs janitorial work for the center?
- i. How often is it done?
- i. Is there a dedicated lounge or rest area? Yes ☐ No ☐
- j. Are night shift personnel allowed 'down time'? Yes ☐ No ☐
- k. Is there a kitchen or meal preparation area available? Yes ☐ No ☐

15. Other Equipment

- a. What types of headsets are used?
- i. Vendor

- ii. Wireless Yes ☐ No ☐
- iii. Wired Yes ☐ No ☐
- b. How do personnel view or track assigned units (to determine coverage and redistribution)?
 - i. Projected map? ☐
 - (1) What information is displayed in this?
 - ii. Manual status board/map? ☐

16. CAD System

- a. Vendor?
- b. Version?
- c. Integrated mapping? ☐
- d. GPS? ☐
- e. Rip & Run? ☐
- f. Interface to or from other systems, please specify
- g. Mobile workstations supported? ☐
- h. Automatic voice fire hall alerting (such as Locution or others)? ☐
 - i. Vendor
 - ii. Model
- i. Does your CAD system support and operate with mobile workstations? Yes ☐ No ☐
 - i. Vendor
 - ii. Type

17. System Status Management

- a. Type
 - i. Deccan ☐
 - ii. SIREN ☐
 - iii. Other
- b. Is the system status management software interfaced with CAD? Yes ☐ No ☐

18. Call Logging/Voice Recording

- a. Type of unit
- b. Vendor/model

- c. Number of channels
- d. Redundancy
- e. Computerized inquiry Yes ☐ No ☐
- f. Does this include a synthesis of:
 - i. Phone ☐
 - ii. CAD ☐ and
 - iii. Radio ☐
- g. Method of archiving
- h. Voice playback for call takers and dispatchers
 - i. At workstation Yes ☐ No ☐
 - ii. Radio Yes ☐ No ☐
 - iii. Phone Yes ☐ No ☐

19. RMS System

- a. Vendor
- b. Version
- c. Is it interfaced to receive call information from CAD? Yes ☐ No ☐
- d. Is it interfaced to upload premise and other information from RMS to CAD?
Yes ☐ No ☐
 - i. If yes, specify what types of information (from what modules)

20. Support Personnel

- a. Dedicated or shared support for
 - i. CAD Yes ☐ No ☐
 - ii. Radio/wireless Yes ☐ No ☐
 - iii. Network Yes ☐ No ☐
 - iv. MWS's Yes ☐ No ☐
 - v. Human Resources Yes ☐ No ☐
 - (1) Internal ☐, or external ☐

21. Business Continuity

- a. Do you have a backup site? Yes ☐ No ☐
 - i. If so, what level is provided in terms of equipment?
 - ii. Is this site cold ☐ warm ☐ or hot ☐

- iii. What is the distance from the primary site?
- iv. What is the time required to fully activate the backup site?
- v. Is there a written policy to activate the backup site? Yes ☐ No ☐
- vi. What is the basis on which it is test/activated?
- b. Is your center on a full uninterruptable power supply (UPS)? Yes ☐ No ☐
- c. Have you fully addressed the security requirements for your center (as per NFPA 1221)? Yes ☐ No ☐
- d. Is there full redundancy for:
 - i. Telephone lines? Yes ☐ No ☐
 - (1) If yes, does this include diverse routing? Yes ☐ No ☐
 - ii. 9-1-1? Yes ☐ No ☐
 - (1) If yes, does this include diverse routing? Yes ☐ No ☐
 - iii. Radio? Yes ☐ No ☐
 - (1) If yes, does this include diverse routing? Yes ☐ No ☐
 - iv. Network? Yes ☐ No ☐
 - (1) If yes, does this include diverse routing? Yes ☐ No ☐
 - v. CAD? Yes ☐ No ☐
 - vi. Recording? Yes ☐ No ☐

22. Appendix 4: Standards of Service

22.1. NFPA 1221: 2010

The standard of service for fire dispatch operations such as TFS is the NFPA 1221 standard; the most recent edition is 2010. For copyright reasons the standard may not be copied in its entirety, however for record, the cover page along with the history of the standard from page 4 are copied below.

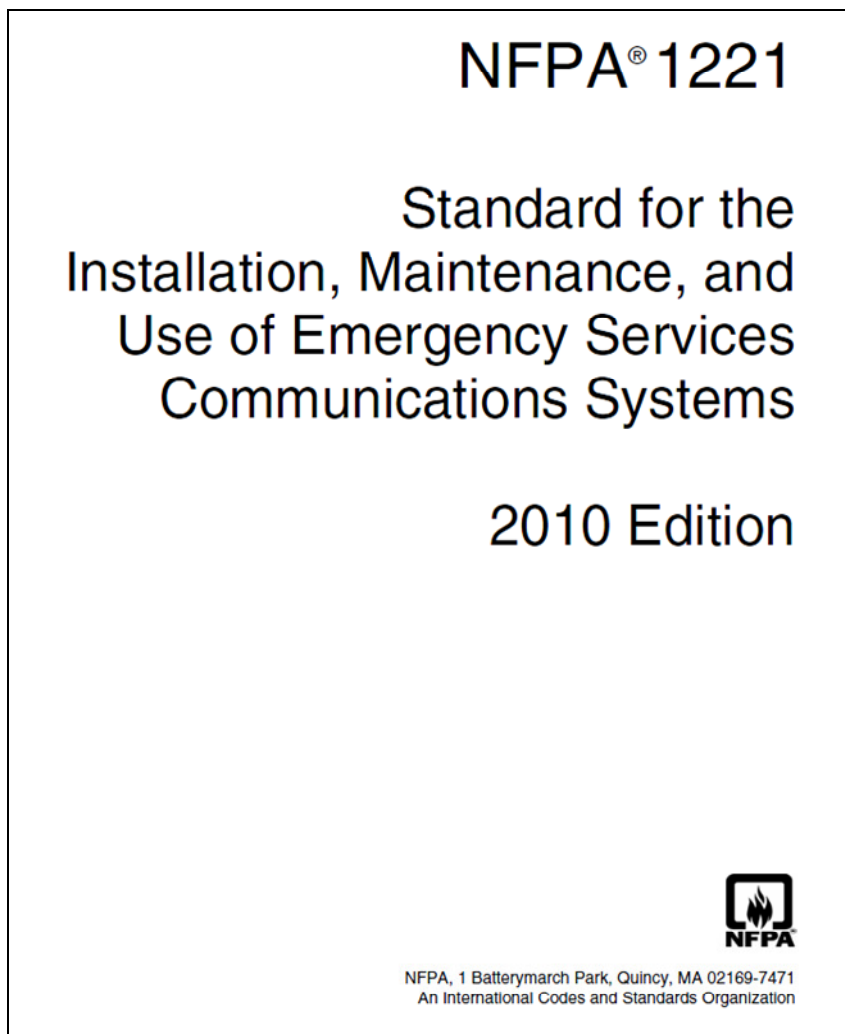


Figure 25: NFPA 1221 Cover Page

The 1221 standard contains the recommended practice for 9-1-1 call management as well as fire call taking and dispatch. The standard is 50 pages in length and includes sections on CAD

systems, network security, training, supervision, business continuity, public alerting systems, etc.

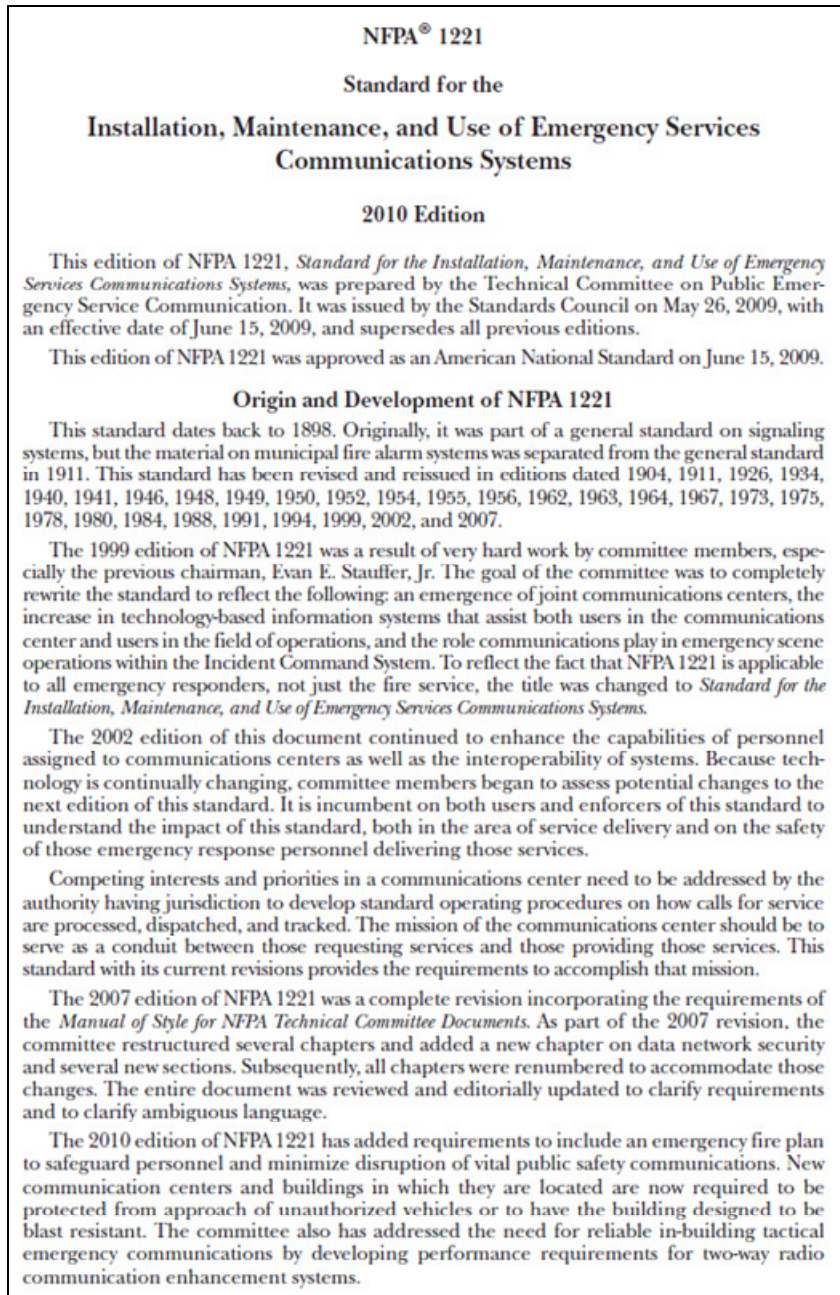


Figure 26: NFPA 1221 Background

22.2. NFPA 1710: 2010

The standard of service for the operation of a fire department such as Toronto Fire Services is NFPA 1710, 2010 edition. The cover page and the history from page 4 are shown in Figures 27 and 28.

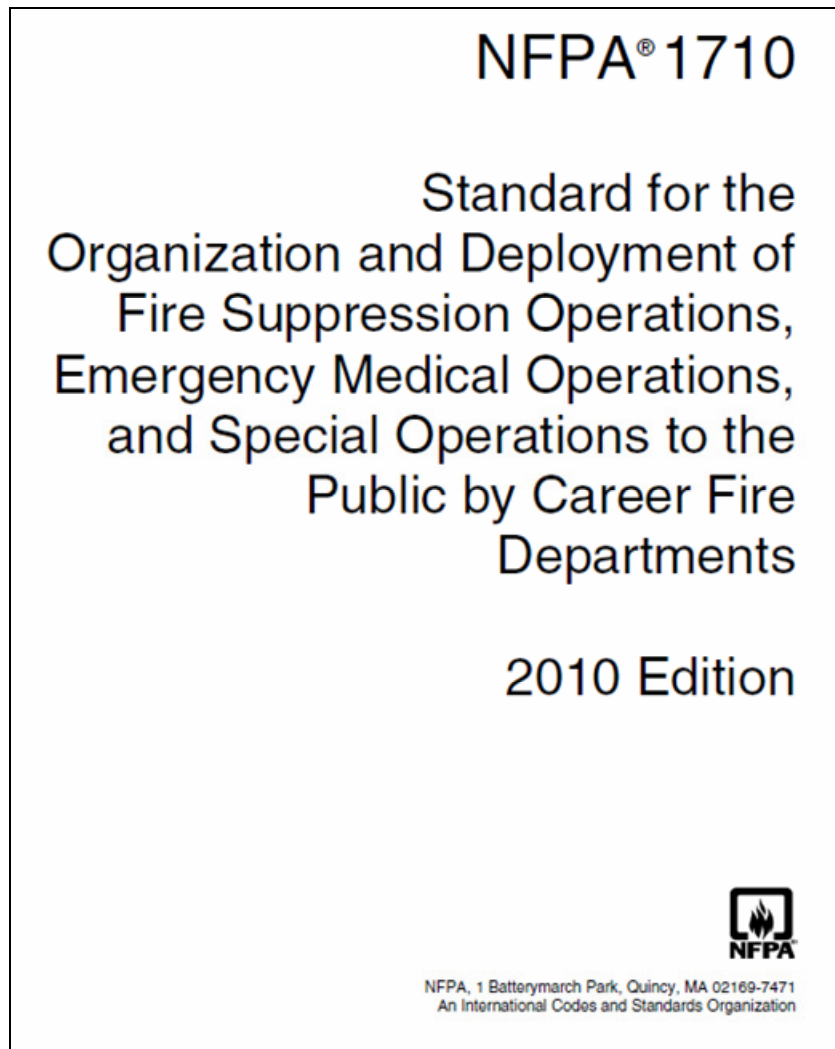


Figure 27: NFPA 1710 Cover Page

The NFPA 1710 standard is 30 pages in length and prescribes all aspects of the operation of a career fire department. The particular relevance for this study is that the standard identifies the expected time that should be taken for fire fighters to acknowledge the receipt of an alarm and then to 'turn out' from the fire hall and to arrive on scene.

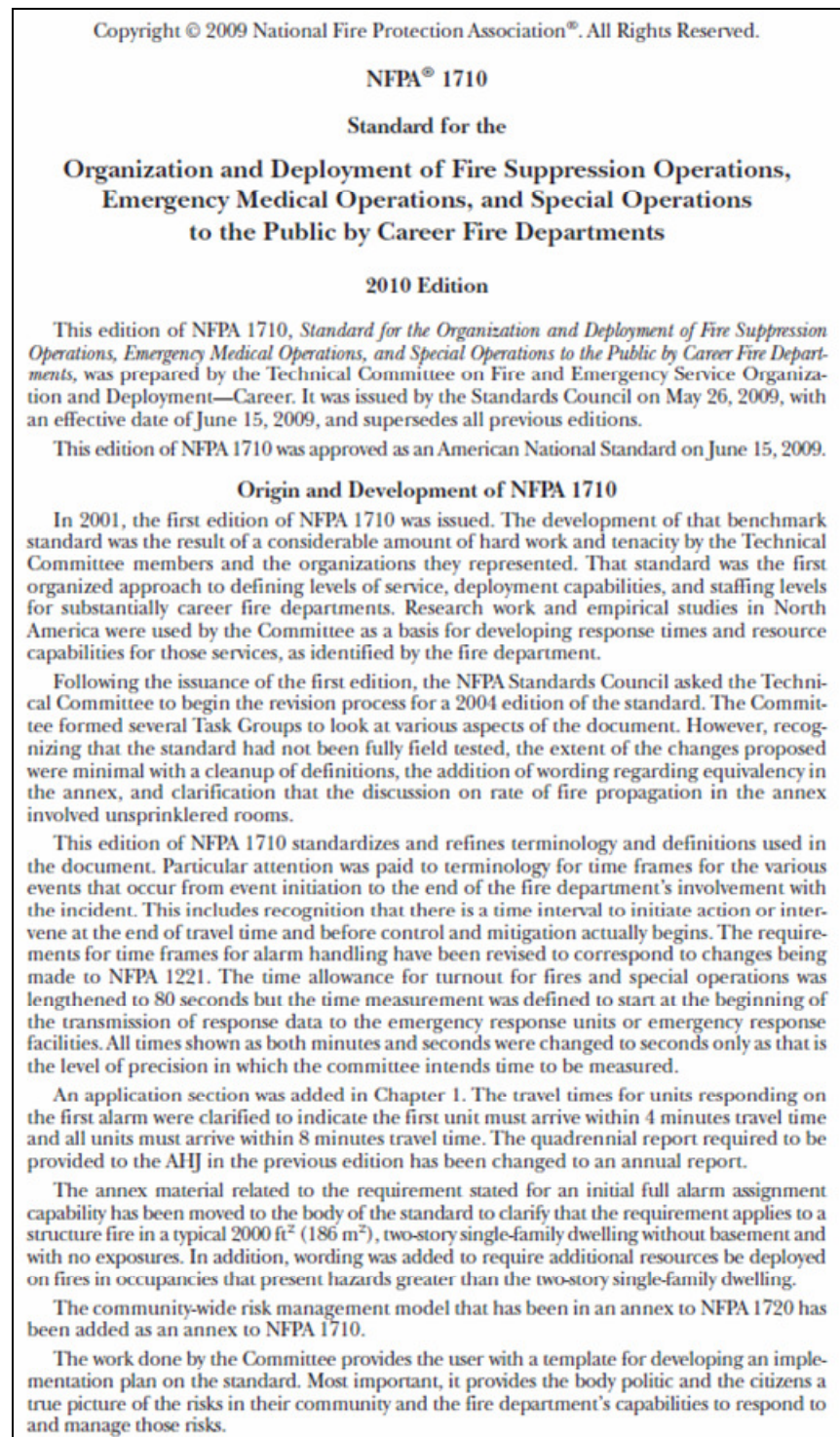


Figure 28: NFPA 1710 History

23. Appendix 5: Consultants Background

Dave Mitchell

Dave Mitchell retired as Division Chief, Communications in 1998 from Vancouver Fire & Rescue Services following a career spanning 32 years. During this time he was responsible for managing the emergency call taking and dispatch for the Vancouver and Whistler Fire Departments. In 1997 he managed the transition of dispatch service for the five Fire Departments on the Sunshine Coast from an independent contractor, to Vancouver Fire/Rescue.

In 1998 Mr. Mitchell was hired by E-Comm, Emergency Communications for Southwest BC as its first Operations Manager. In this role he was a member of the founding senior management team, and was responsible for the transition of the Regional 9-1-1 Control Centre staff from the Vancouver Police Department to its current location at 3301 East Pender in June 1999. By June 2000 this included the management of approximately 200 call takers, dispatchers and team managers in addition to a ULC listed alarm monitoring service.

He left E-Comm in June 2000 to work as a consultant, and since that time has managed the development of corporate, strategic and operational plans for a number of clients. In addition he has completed a number of fire hall location studies for clients throughout the Province, provided transition management services to Vancouver Fire/Rescue as it implemented a new Computer Aided Dispatch system and is currently project manager for development of their new records management system. In 2004 Mr. Mitchell provided technical advice to the Hon. Gary Filmon as part of the Firestorm 2003 Review. In 2005, along with ICTconsult Inc. he conducted a full review of the radio system for the fire departments on the Sunshine Coast Regional District and in 2006 he conducted a similar review for the Central Okanagan Regional District. During the past year he was the project management for an implementation of Intergraph CAD for Vancouver, Richmond, Whistler and other fire departments that are dispatched by E-Comm.

More recently he has conducted a master fire plan for West Vancouver in addition to managing a major communications upgrade for the Regional District of Fraser-Fort George, a fire hall location study for the Fort St. John Fire Department and a fire services review for the Comox Strathcona Regional District. Along with John Vokes and Doug McRae he has recently conducted a fire services review for the Saanich Fire Department and is presently conducting a

master fire plan for the North Vancouver District Fire/Rescue Department, a fire services review for the Columbia Shuswap Regional District and developing an implementation model for the new sub-regional fire department in the Howe Sound corridor, the Howe Sound East Volunteer Fire Department.

Mr. Mitchell holds a Bachelor of Arts Degree from Simon Fraser University in addition to a diploma from their Executive Management Development Program. He is past Chair of the Board of Directors of the Vancouver General Hospital and University of British Columbia Hospital Foundation and is a member of the National Fire Protection Association (NFPA), the National Emergency Number Association (NENA), the Association of Public-Safety Communications Officials (APCO), the Fire Chiefs' Association of British Columbia (FCABC), the Canadian Association of Management Consultants (CAMC) and is a member of the Public Safety Communications Advisory Committee of Kwantlen College.

Melanie Smith

Melanie Smith worked for nine years as a police dispatcher for the City of Vancouver and during that time assisted in developing operational procedures, emergency procedures, and operational disaster and recovery plans. In 1996 she assisted in developing the Request for Proposal for the new CAD system for E-Comm and in 1999 was hired by E-Comm as one of the first eleven Team Managers. As well as training and supervisory duties, she worked on the implementation of the Altaris CAD system with responsibilities for data collection, training and developing interface and functional design specifications with all participating agencies (Fire, Police and Ambulance). She became the CAD Administrator, involving her in both operational and technical aspects of the CAD system. Along with managing day to day support issues, she successfully managed the transitions of Vancouver Fire (including all 7 client agencies), Port Moody Fire, Vancouver Police and B.C. Ambulance Service (Region 2) onto the E-Comm CAD platform.

Ms. Smith left E-Comm in 2003 to work as a consultant and since then has been involved with many projects. She has participated with a dispatch review for the Saanich Fire Department. She has also worked with Northrop-Grumman/ PSI in the training and implementation of the Altaris CAD and Command Point CAD systems. Melanie assisted Dave Mitchell & Associates working with the Regional District Fraser-Fort George on an FDM CAD and RMS implementation for the fire services served by the Prince George Fire/Rescue Service. For two

years, Melanie worked with the RCMP as the CAD Implementation Coordinator for the Vancouver Island District area, as part of the RCMP PRIME-BC RMS Renewal project. This portion of PRIME-BC implementation includes transitioning two Police Operations Communications Centers (OCCs) along with twenty eight (28) detachment areas in central and northern Vancouver Island onto the Versaterm CAD and RMS systems. She continues to work as a dispatcher for the RCMP on a part time basis in the Courtenay OCC on Vancouver Island. Most recently Melanie assisted E-Comm in implementing the Intergraph FireCAD project for the Lower Mainland. This project includes implementation of an Intergraph CAD system, a new Fire Hall Alerting system, a CAD to CAD interface between the E-Comm Fire system and the BC Ambulance Service CAD system and other interfaces for E-Comm's fire agencies. She continues to work with E-Comm on this project, assisting in implementing the full functionality intended for the project.

Melanie has completed the Law Enforcement diploma from Grant McEwan College (Edmonton) in 1981 and in 2006 received a Business Analyst diploma from Royal Roads University (Victoria). She is currently a member of the National Fire Protection Association (NFPA), and the Association of Public-Safety Communications Officials (APCO).

Ian MacDonald

Ian MacDonald (BA (Hons), MA, LLB), is a former lawyer who practiced international corporate law in Canada and the United Kingdom. Mr. MacDonald has worked on large public and private financings in Canada, including the Strait Crossing Inc. project that put the financing and development agreements in place for the construction of the bridge linking Prince Edward Island with New Brunswick. He also advised extensively on other financings, shareholder agreements, corporate restructurings, and corporate acquisitions.

After moving to England, Mr. MacDonald became managing partner of Arnander, Irvine & Zietman, an intellectual property/litigation firm in 1999 and had a varied practice advising clients on company formation, shareholder and members' agreements, corporate financing, governance issues, and privacy matters.

Mr. MacDonald retired as a lawyer in January 2004 and returned to Canada, since which time he has acted as a volunteer director on two boards, acting as the chair of the governance committee for one, and assisted various community groups in developing long term strategic

and business plans. Mr. MacDonald has previously worked with Planetworks on the CREST radio project, conducting a full governance review of that organization.

He has worked with Dave Mitchell & Associates on a number of different projects, including a fire services review for the Comox Strathcona Regional District, a review of the organization and structure of the regional fire services in the Columbia Shuswap Regional District and consulting with the City of Lethbridge in connection with the consolidation of EMS dispatch services in the Province of Alberta. Ongoing work includes a review of the Public Safety Communications Centre in Lethbridge, and a master fire plan for the City of Pitt Meadows.